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### Systems Cost/Performance Analysis (Study 2.3) Final Report

Volume II, Appendix A: Data Base

Prepared by

ADVANCED MISSION ANALYSIS DIRECTORATE Advanced Orbital Systems Division

27 September 1974



#### Prepared for

OFFICE OF MANNED SPACE FLIGHT NATIONAL AERONAUTICS AND SPACE ADMINISTRATION Washington, D.C. 20546

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Systems Engineering Operations

THE AEROSPACE CORPORATION

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Volume II, Appendix A: Data Base . .

Prepared

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#### FOREWORD

This report documents The Aerospace Corporation effort on Study 2.3, Systems Cost/Performance Analysis, performed under NASA Contract NASW-2575 during Fiscal Year 1974. The effort was directed by Mr. B. H. Campbell. Mr. R. D. Kramer, Marshall Space Flight Center and Mr. R. R. Carley, NASA Headquarters were the NASA Study Directors for this study. Their efforts in providing technical direction throughout the duration of the study are greatly appreciated.

This volume is one of three volumes of the final report for Study 2.3. The three volumes are:

Volume I Executive Summary

Volume II Systems Cost/Performance Model

Appendix Data Base

Volume III Programmer's Manual and User's Guide

Volume I summarizes the overall report. It includes the relationship of this study to other NASA efforts, significant results, study limitations, and suggested additional effort.

Volume II provides a detailed description of the Systems Cost/Performance Model. It also includes the model checkout and the results for three payload test cases. The Data Base is provided in the Appendix to Volume II.

Volume III provides a detailed description of how the Systems Cost/Performance Computer Program is organized and operates. The program listing, detailed flow charts and user restrictions are included.

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#### ACKNOWLEDGMENTS

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E. R. Johnson

Thermal Control

H. H. Yoshikawa

Vehicle Sizing

R. T. Blake

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1. INTRODUCTION



This appendix contains data on selected payload equipments (components) which have been collected for the purpose of exercising the Systems Cost/Performance Model. The reader should be aware that, although most of the data is accurate, approximations based on engineering judgment and experience are used wherever actual data was unavailable. The approximations are justified by the objective of the study which was to develop a cost/performance model. Assuming that the model is successfully developed and is accepted for use by a body of users, the data base should be expanded and the approximations replaced by actual data. The following paragraphs are devoted to an explanation of how the data are organized and how to interpret the information contained on the data pages.

The equipments are organized according to the following subsystems which use the specific components:

- a. Stabilization and Control
- b. Auxiliary Propulsion
- c. Data Processing
- d. Communication
- e. Electrical Power

The data sheet for each component states which subsystem utilizes the component, which configurations require the component, which equipment type the component is categorized as, and the data base identifier or code number assigned to the component.

The data describing the component consist of the following four types:

- a. Performance
- b. Safety
- c. Cost
- d. Schedule

#### 1.1. PERFORMANCE DATA

The performance data are separated into eight categories:

- a. Technical Characteristics
- b. Power
- c. Weight
- d. Volume
- e. Vibration
- f. Temperature
- g. Pressure
- h. CDPI

The technical characteristics are peculiar to each equipment type. Generally speaking, the technical characteristics provide the data required to select or differentiate among the components and additional data for the component which, if selected, provides information for design of the remainder of the subsystem.

The power data includes three basic descriptions: the power requirements, the voltage requirements, and the conversion requirements. The average power is the average power required by the component during its active state. The maximum power is the power required either during load conditions or during any high power transient periods. The minimum voltage requirement exists during quiescent periods, powered down periods, or the turned-off condition, if allowable.

The voltage requirements are the specifications for which the equipment is rated, i.e., the nominal voltage, and the maximum and minimum voltages for which the component will continue to perform within specifications.

If the specific component is selected, the converter/inverter requirement flag identifies any need for special power conversion equipment. Since the requirement is identified as a flag, the number used should correspond to the identifier for the actual converter or inverter required.

The component weight includes all weight which is essential to performing the functions associated with the component. Examples of additional functional weight include:

- a. Telemetry instrumentation
- b. Failure sensing and switching
- c. Interface equipment which is not ordinarily a separate component as selected by the Systems Cost/Performance Model.

Weight which comes under different functional descriptions is not included. Examples are:

- a. Wiring harness
- b. Structural mountings

Volume is the direct counterpart of weight and is determined according to the same rules.

The vibration specification includes both random and nonrandom categories. Although vibration is not used in the FY 74 Model, the intent is to use the specification in future models.

The maximum and minimum temperature information are the temperature specifications for which the equipment is qualified.

The pressure information is the ambient pressure for which the component is qualified.

The CDPI information for each component is used for the express purpose of designing the Data Processing and Communication Subsystems. Command requirements are divided into three categories: power, time tagged, and other. The telemetry requirements are separated into two categories, i.e., low rate and high rate telemetry requirements. The telemetry information includes:

- a. Number of analog telemetry points
- b. Number of digital telemetry points
- c. Sample rate
- d. Word length

#### 1.2 SAFETY DATA

The intent in supplying the safety information is to indicate the failure mode, the numerics describing the failure mode, the redundancy type, and the maximum amount of redundancy. To this end, the failure model as stated in the data base indicates both the failure mode and the redundancy type. If the failure mode is modeled by an exponential, then the failure rate must be provided. Both the mean and standard deviation are supplied in the event of a normal (gaussian) failure mode. The dormancy factor must be provided for either failure mode. Because the Systems Cost/Performance Model can add an undesirable (from an engineering point of view) amount of redundancy, the total allowable number of redundant elements is specified. This redundancy number includes both the original number of components as well as the components added for the purpose of increasing system reliability.

#### i.3 COST DATA

. Component cost information must be supplied for each of the following three categories:

- a. Design engineering
- b. Test and evaluation
- c. Unit production

An additional piece of information which must be provided is the reference quantity required to meet the performance requirements. Redundancy is not included in the reference quantity. A nondimensional factor has been provided for use in future models where the effect of standardization or use of off-the-shelf hardware is to be incorporated.

#### 1.4 SCHEDULE DATA

Component schedule data includes both the development lead time and the qualification lead time. Each lead time is separated into a constant and a variable. Normally, the constant lead times will be exactly the same

for all components of the same type. In addition, a state-of-art factor is provided based on the component being in a state of development somewhere between off-the-shelf and a new concept requiring an advance in technology.

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2. EQUIPMENT DATA



```
Subsystem:
                   S&C (0101)
Configurations:
                   Dual Spin
Equipment Type: Despin Mechanical Assembly
Performance
   Technical Characteristics
      (1) Bearing and motor friction (30): 1.1 mrad (0.064 deg)
                                            0.21 mrad (0.012 deg)
      (2) Bearing runout (3¢):
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
   Power
                                              2.0
      Average Power (watts):
     Maximum Power (watts):
                                             88.0
                                              0
     Minimum Power (watts):
     Nominal Voltage (volts):
                                             28.0
                                             32,0
     Maximum Voltage (volts):
                                             24 0
     Minimum Voltage (volts):
      Converter/Inverter
        Requirement (flag):
                                             9.87 (21.75 lb) .
   Weight (kg):
                                             1.78 \times 10^4 \ (0.627 \ \text{ft}^3)
   Volume (cc):
   Vibration
     Random (g, rms):
     Non-Random (g):
   Temperature
                                             322 (120° F)
     Maximum (<sup>o</sup>K):
                                             266 ( 20° F)
     Minimum (<sup>0</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

#### Performance (continued)

CDPI			
Power Switching Commands (No.):			
Time Tagged Commands (No.):			
Other Commands (No.):	1 .		
High Rate Telemetry			
Analog Points (No.):	4 .		
Digital Points (No.):	1		
Sample Rate (sec <sup>-1</sup> ):	1		
Word Length (bits):	8		
Low Rate Telemetry	_		
Analog Points (No.):	12		
Digital Points (No.):	1		
Sample'Rate (sec 1):	0.0075		
Word Length (bits):	. 8		
Safety			
Failure Model (flag):	1		
Failure Parameters			
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	400		
Standard Deviation (x 10 <sup>+9</sup> hr):	•		
Dormancy Factor (N.D.):	1.0		
Total Redundant Elements (No.):	1		
Cost			
Design Engineering (\$1000):	1000.0		
Test and Evaluation (\$1000):	300.0		
Unit Production (\$1000):	70.0		
Reference Quantity (No.):	1		
Factor (N.D.):	.1		
Schedule	6.6		
Development Lead Time Constant (months):	2.8		
Development Lead Time Variable (months):	0.9		
Qualification Lead Time Constant (months)	0. 1		
Qualification Lead Time Variable (months)	1.0		
State-of-Art Factor (N.D.):	1. 0		

S&C (Included in 0101) Subsystem: Dual Spin Configurations: Equipment Type: Despin Electronics Assembly Performance Technical Characteristics (1)(2)(3)(4) (5) (6) (7). (8) (9)  $\{10\}$ Power Average Power (watts): 6.24 Maximum Power (watts): 9.5 Minimum Power (watts): 3.0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 3.9 (8.5 lb)  $8.5 \times 10^3$  (0.30 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Tempe,rature Maximum (°K): Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

#### Performance (continued)

#### CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 2-High Rate Telemetry Analog Points (No.): Digital Points (No.): 3 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): 1 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 0.0075 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr); 13,700 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 3、 Cost Design Engineering (\$1000): 320.0 Test and Evaluation (\$1000): 206.0 92.0 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule , 7, 3 Development Lead Time Constant (months): Development Lead Time Variable (months): 1.1 Qualification Lead Time Constant (months): 0.1 Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

Subsystem: S&C (0202) Configurations: All Equipment Type: Valve Driver Assembly (3 assemblies for 6 valves) Performance Technical Characteristics (1) Number of valves: 6 (2)(3) (4)(5) (6) (7)(8) (9) .(10)Power Average Power (watts): 0.12 Maximum Power (watts): 27.0 Minimum Power (watts): 0 Nominal Voltage (volts): -28.0Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 1.9 (4.2 lb)  $1.2 \times 10^4 \quad (0.42 \text{ ft}^3)$ Volume (cc): . Vibration Random (g, rms) Non-Random (g): Tempe rature 322 (120° F) Maximum (°K): Minimum (°K): '266'(20°F) Pressure (kg/m<sup>2</sup>):

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): 3 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 Failure Parametérs Failure Rate or Mean (x 10<sup>±9</sup> hr): 966 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 164.0 Test and Evaluation (\$1000): 15.0 Unit Production (\$1000): 21.0 Reference Quantity (No.): $\mathbf{1}^{i}$ Factor (N.D.): Schedule Development Lead Time Constant (months): 2.6 2.0 -Development Lead Time Variable (months): Qualification Lead Time Constant (months): 3.0 Qualification Lead Time Variable (months): 0.7 State-of-Art Factor (N.D.): ,1.0

```
S&C (0302)
Configurations:
                    A11
Equipment Type:
                    Sun Sensor Assembly (with electronics)
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
     (5)
     (6)
     (7)
     (8)
     '(9)
    (10)
  Power
     Average Power (watts):
                                   1.0
     Maximum Power (watts):
                                   1.0
    Minimum Power (watts):
                                   0
    Nominal Voltage (volts):
                                  28.0
    Maximum Voltage (volts):
                                  32.0
    Minimum Voltage (volts):
                                  24.0
    Converter/Inverter
       Requirement (flag):
 Weight (kg):
                                  0.545 (1.216)
 Volume (cc):
                                  6.2 \times 10^3 (0.22 ft<sup>3</sup>)
 Vibration
    Random (g, rms):
    Non-Random (g):
 Tempe rature
   Maximum (<sup>0</sup>K):
                                 311 (100° F)
   Minimum (<sup>O</sup>K):
                                 275 (35° F)
Pressure (kg/m<sup>2</sup>):
```

Subsystem:

#### Performance (continued)

#### CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): 5 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): Digital Points '(No.): 1, Sample Rate (sec<sup>-1</sup>): 0.0075 Word Length (bits): 8 Safety 1. Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±,9</sup> hr): 2499 Standard Deviation (x 10 +9 hr): Dormancy Factor (N.D.): 0.5 6 Total Redundant Elements (No.): Cost 290.0 Design Engineering (\$1000):-173.0-Test and Evaluation (\$1000): --8.0 Unit Production (\$1000): 2 Reference Quantity (No.): · 1 Factor (N.D.): Schedule 8.0 Development Lead Time Constant (months) . Development Lead Time Variable (months) 2.0 8, 4 Qualification Lead Time Constant (months) 0.4 Qualification Lead Time Variable (months)

State-of-Art Factor (N.D.):

1.0

```
Configurations:
                    Dual Spin
Equipment Type:
                   Nutation Damper
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
     (5)
     (6)
     (7)
     (8)
   (9)
    (10)
  Power
    Average Power (watts):
                                  0
    Maximum Power (watts):
    Minimum Power (watts):
    Nominal Voltage (volts):
                                 0
    Maximum Voltage (volts):
                                 0
    Minimum Voltage (volts):
    Converter/Inverter
      Requirement (flag):
 Weight (kg):
                                 1.8 (4.0 lb)
 Volume (cc):
                                 2 \times 10^4 (0.8 ft<sup>3</sup>)
 Vibration
   Random (g, rms):
   Non-Random (g):
Temperature
   Maximum (<sup>0</sup>K):
                                311 (100° F)
   Minimum (°K):
                                275 (35° F)
Pressure (kg/m<sup>2</sup>):
```

S&C (0401)

Subsystem:

```
Performance (continued) .
    CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
       Other Commands (No.):
       High Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
          Sample Rate (sec<sup>-1</sup>):
          Word Length (bits):
       Low Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
          Word Length (bits):
Safety
   Failure Model (flag):
                                                      1
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                    172
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                      1.0
   Total Redundant Elements (No.):
                                                      3
Cost
   Design Engineering ($1000):
                                                   155.0
   Test and Evaluation ($1000):
                                                    25.0
   Unit Production ($1000):
                                                     9.0.
   Reference Quantity (No.):
                                                     1
   Factor (N.D.):
                                                     1
Schedule
   Development Lead Time Constant (months):
                                                     5.4
   Development Lead Time Variable (months):
                                                   . 2.3
   Qualification Lead Time Constant (months):
                                                     2.2
   Qualification Lead Time Variable (months):
                                                     0.2
  State-of-Art Factor (N.D.):
                                                     1.0
```

Subsystem: S&C (0501) Configurations: Dual Spin Equipment Type: Gimbal Electronics Assembly Performance Technical Characteristics (1) Resolver accuracy (3 $\sigma$ ): 0.51 mrad (0.029 deg) (2) (3) (4)(5) (6)**(7)** ` (8) (9) (10)Power Average Power (watts): 3, 5 Maximum Power (watts): 5.0 Minimum Power (watts): 2.0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32,0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 2.83 (6.25 lb)  $7.9 \times 10^3$  (0.28 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 311 (100° F) Minimum (<sup>o</sup>K): 275 (35° F) Pressure (kg/m<sup>2</sup>):

# Performance (continued) CDPI Power Switching C

```
Power Switching Commands (No.):
      Time Tagged Commands (No.):
                                                     6
      Other Commands (No.):
     High Rate Telemetry
         Analog Points (No.):
                                                      2
         Digital Points (No.):
                                                      1
        Sample Rate (sec 1):
                                                      8
         Word Length (bits):
      Low Rate Telemetry
                                                      Ί
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                      0.0075
                                                      8
         Word Length (bits):
Safety
                                                      1
   Failure Model (flag):
 · Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                   2430
      Standard Deviation (x 10<sup>+9</sup> hr):
                                                      0.5
      Dormancy Factor (N.D.):
                                                      3
   Total Redundant Elements (No.):
Cost
   Design Engineering ($1000):
   Test and Evaluation ($1000):
                                                             mission equipment
   Unit Production ($1000):
                                                      1
   Reference Quantity (No.):
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months):
                                                       7.3
  : Development Lead Time Variable (months):
                                                       3. 1
   Qualification Lead Time Constant (months):
                                                       3, 8
   Qualification Lead Time-Variable (months):
                                                      0.4
   State-of-Art Factor (N.D.):
                                                       1,2
```

Configurations: Dual Spin Equipment Type: Control Timing Assembly Performance Technical Characteristics (1) Programmer sine wave (3σ): 0.93 mrad (0.053 deg) (2) Drive quantization and delay  $(3\sigma)$ : 0.87 mrad (0.050 deg) (3) Measurement compensation  $(3\sigma)$ : 0.17 mrad (0.010 deg) (4) Pipper drift (3σ): 0.31 mrad (0.018 deg) (5) Quantization noise (3σ): 0.12 mrad (0.007 deg) (6) (7)(8)(9) (10)Power 3.5 Average Power (watts): 5.0 Maximum Power (watts): 2.0 Minimum Power (watts): 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 3.4 (7.4 lb) Weight (kg):  $1.04 \times 10^4 \quad (0.367 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>O</sup>K): 311 (100° F) Minimum (<sup>o</sup>K): 275. (35° F) Pressure (kg/m<sup>2</sup>):

Subsystem:

S&C (0601)

# CDPI

CDII	
Power Switching Commands (No.):	5
Time Tagged Commands (No.):	
Other Commands (No.):	30
High Rate Telemetry	•
Analog Points (No.):	
Digital Points (No.):	8
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	1 .
Sample Rate (sec <sup>-1</sup> ):	0.0075
Word Length (bits):	8
Safety .	
Failure Model (flag):	1
Failure Parameters	
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	14,582
Standard Deviation (x $10^{+9}$ hr):	<i>:</i>
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	3
Cost	u •
Design Engineering (\$1000):	651.0
Test and Evaluation (\$1000):	440.0
Unit Production (\$1000):	112.0
Reference Quantity (No.):	2
Factor (N.D.):	1 .
Schedule	
Development Lead Time Constant (months):	11.0
Development Lead Time Variable (months):	3.4
Qualification Lead Time Constant (months):	5.5
Qualification Lead Time Variable (months):	0.3
State-of-Art Factor (N.D.):	1.0

```
Configurations:
                   Dual Spin
Equipment Type:
                   Bi-Axial (Gimbal) Drive Assembly
                    (two required per antenna)
Performance
   Technical Characteristics
      (1) Drive quantization (3\sigma): 0.28 mrad (0:016 deg)
      (2) Gimbal drive error (3\sigma): 0.44 mrad (0.025 deg)
      (3) Biax droop error (3σ):
                                    0.31 mrad (0.018 deg)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
  Power
                                      2.8
     Average Power (watts):
     Maximum Power (watts):
                                      5.6
     Minimum Power (watts):
                                      1.4
     Nominal Voltage (volts):
                                    28.0
                                    32. 0
     Maximum Voltage (volts):
     Minimum Voltage (volts):
                                    24.0
     Converter/Inverter
        Requirement (flag):
  Weight (kg):
                                    6.44 (14.2 lb)
                                    9.9 \times 10^3 (0.35 ft<sup>3</sup>)
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
     Maximum (<sup>o</sup>K):
                                    322 (120° F).
     Minimum (<sup>o</sup>K):
                                    266 (20° F)
  Pressure (kg/m<sup>2</sup>):
```

S&C (0701)

Subsystem:

```
CDPI
      Power Switching Commands (No.):
      Time Tagged Commands (No.):
      Other Commands (No.):
                                                    2
      High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
                                                    4
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                    0.0075
         Word Length (bits):
                                                    8
Safety
   Failure Model (flag):
                                                    1
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                  650
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                  . 1.0
   Total Redundant Elements (No.):
Cost
   Design Engineering ($1000):
   Test and Evaluation ($1000):
                                                           mission equipment .
   Unit Production ($1000):
  Reference Quantity (No.):
   Factor (N.D.):
Schedule
                                                    7.5
   Development Lead Time Constant (months):
                                                    3.2
   Development Lead Time Variable (months):
                                                    3.9
   Qualification Lead Time Constant (months):
                                                    0.4
   Qualification Lead Time Variable (months):
                                                    1.2
   State-of-Art Factor (N.D.):
```

S&C (0801) Subsystem: Configurations: Dual Spin Equipment Type: Non-Scanning Earth Sensor Assembly (with electronics) Performance · Technical Characteristics (1) Sensor noise (3σ): 4.42 mrad (0.253 deg) (2) Radiance irregularity (3σ): 0.52 mrad (0.030 deg) (3) Quantization error (3σ): 0.12 mrad (0.007 deg) (4) Sun interference  $(3\sigma)$ : 0.35 mrad (0.020 deg) (5) Moon interference (3σ): 0.87 mrad (0.050 deg) (6) Threshold aging (3σ): 0.56 mrad (0.032 deg) (7)(8)(9) (10)Power 0.6 Average Power (watts): 0.9 Maximum Power (watts): Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 3.5 (7.7 lb) 790 (0.028 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 311 (100° F) 275 (35° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): 14 Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 4 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 0.0075 Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 3212 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 4 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 66.0 Test and Evaluation (\$1000): 1.05.0 Unit Production (\$1000): 33.0 2 Reference Quantity (No.): Factor (N.D.): 1 Schedule .1.6 Development Lead Time Constant (months): 2,5 Development Lead Time Variable (months):

9. 4 4. 7

1.0

Qualification Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

Subsystem: S&C (0201) Configurations: A11 Equipment Type: Valve Driver Assembly Performance Technical Characteristics (1) Number of valves: 12 (2) (3)(4)(5) (6) (7) (8) (9) (10)Power Average Power (watts): 1.0 36.0 -Maximum Power (watts): Minimum Power (watts): 0 Nominal Voltage (volts): 28.-0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 22.0 Converter/Inverter Requirement (flag): C 01 (1401)  $0.73^{\circ}$  (1.6 lb) Weight (kg):  $1.4 \times 10^3$  (0.05 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (°K): 322 (120° F) Minimum (<sup>o</sup>K):  $266 (20^{\circ} F)$ Pressure (kg/m<sup>2</sup>):

CDPI	
Power Switching Commands (No.):	. 2
Time Tagged Commands (No.):	•
Other Commands (No.):	. 8
High Rate Telemetry	
Analog Points (No.):	13
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits):	8
Low Rate Telemetry .	
Analog Points (No.):	4
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	1910
Standard Deviation (x $10^{+9}$ hr):	a
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	<sup>.</sup> 4
Cost	
Design Engineering (\$1000):	39.0
Test and Evaluation (\$1000):	28.0
Unit Production (\$1000):	10.0
Reference Quantity (No.):	2
Factor (N.D.):	1
Schedule	•
Development Lead Time Constant (months):	2.6
Development Lead Time Variable (months):	0.2
Qualification Lead Time Constant (months):	3, 0
Qualification Lead Time Variable (months):	0.1
State-of-Art Factor (N.D.):	1.0

```
Subsystem:
                   S&C (0301)
Configurations:
                   A11
                   Sun Sensor Assembly (with electronics)
Equipment Type:
                   (single axis)
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
  Power
      Average Power (watts):
                                    1.0
     Maximum Power (watts):
                                  1.0
     Minimum Power (watts):
                                    0
                                  28.0
     Nominal Voltage (volts):
     Maximum Voltage (volts):
                                  32.0
     Minimum Voltage (volts):
                                  24.0
     Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                  0.39 (0.85 lb)
                                  280 (0.01 ft<sup>3</sup>)
   Volume (cc):
   Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
                                  311 (100°F)
     Maximum (°K):
                                  255 ( 0° F)
     Minimum (<sup>0</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

# CDPI

Power Switching Commands (No.)	
Time Tagged Commands (No.):	
Other Commands (No.):	4
High Rate Telemetry	
Analog Points (No.):	7
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits):	8
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	•
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	1500
Standard Deviation (x 10 <sup>+9</sup> hr):	
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	6
Cost	
Design Engineering (\$1000):	230. C
Test and Evaluation (\$1000):	150. C
Unit Production (\$1000):	20. C
Reference Quantity (No.):	. 2
Factor (N.D.):	1
Schedule	-
Development Lead Time Constant (months):	8.0
Development Lead Time Variable (months):	4.9
Qualification Lead Time Constant (months):	8.4
Qualification Lead Time Variable (months):	1.5
State-of-Art Factor (N.D.):	1.0

```
S&C (1001)
Subsystem:
Configurations:
                   Yaw Spin
Equipment Type: Control Electronics Assembly
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
      (5)
      (6) Controller error (30): 1.789 mrad (0.1025 deg)
      (7)
      (8)
      (9)
     (10)
   Power
                                    4.0
      Average Power (watts):
                                    4.0
     Maximum Power (watts):
                                    0
      Minimum Power (watts):
                                   28.0
     Nominal Voltage (volts):
     Maximum Voltage (volts):
                                   32.0
                                   22.0
     Minimum Voltage (volts):
      Converter/Inverter
                                   C 01 (1401)
        Requirement (flag):
                                   4. 14 (9. 12 lb)
   Weight (kg):
                                   2.5 \times 10^4 \ (0.9 \text{ ft}^3)
   Volume (cc):
   Vibration
      Random (g, rms):
     Non-Random (g):
   Temperature
                                 . 322 (120° F)
     Maximum (<sup>o</sup>K):
                                   266 (20°F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

```
DPI
                                                   1
  Power Switching Commands (No.):
  Time Tagged Commands (No.):
                                                  20
  Other Commands (No.):
 High Rate Telemetry
                                                   9
     Analog Points (No.):
     Digital Points (No.):
    Sample Rate (sec<sup>-1</sup>):
                                                 125
    Word Length (bits):
                                                  13
 Low Rate Telemetry
                                                  23
     Analog Points (No.):
    Digital Points (No.):
    Sample Rate (sec<sup>-1</sup>):
                                                   1
     Word Length (bits):
                                                  14
ŧу
                                                   1
ailure Model (flag):
ailure Parameters
 Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                             10,000
 Standard Deviation (x 10<sup>+9</sup> hr):
                                                   0.5
 Dormancy Factor (N.D.):
                                                   4
otal Redundant Elements (No.):
                                                 750.0
esign Engineering ($1000):
                                                 500.0
est and Evaluation ($1000):
                                                 130.0
nit Production ($1000):
                                                   2
eference Quantity (No.):
                                                   1
actor (N.D.):
dule
                                                  11.0
evelopment Lead Time Constant (months):
                                                   9.3
evelopment Lead Time Variable (months):
                                                   5.5
ualification Lead Time Constant (months):
                                                   1.2
ualification Lead Time Variable (months):
                                                   1.5
:ate-of-Art Factor (N.D.):
```

Subsystem: S&C (1101) Configurations: Yaw Spin Equipment Type: Rate Gyro Assembly Performance Technical Characteristics (1)(2)(3) (4)(5) (6) (7)(8) (9) (10)Power 12.0 Average Power (watts): 18.0 Maximum Power (watts): 6.0 Minimum Power (watts): 28.0 Nominal Voltage (volts): 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter C 01 (1401) Requirement (flag): 1.47 (3.23 lb) Weight (kg):  $2.4 \times 10^3$  (0.086 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>0</sup>K): 278 ( 40° F) Minimum (<sup>o</sup>K):

Pressure (kg/m<sup>2</sup>):

CDPI.	
Power Switching Commands (No.):	. 1
Time Tagged Commands (No.):	
Other Commands (No.):	1
High Rate Telemetry	
Analog Points (No.):	1
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits):	8
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	•
Failure Model (flag):	1
Failure Parameters	
Titles Date on Moon to 10 That	
Failure Rate or Mean (x 10 <sup>-7</sup> hr):	11,941 .
Standard Deviation (x 10 hr):	11,941
	• •
Standard Deviation (x 10 <sup>+9</sup> hr):	1.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.):	1.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):	1.0
Standard Deviation (x 10 <sup>+9</sup> hr):  Dormancy Factor (N.D.):  Total Redundant Elements (No.):  Cost	1.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000):	1.0 3 285.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000):	1.0 3 285.0 118.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000):	1.0 3 285.0 118.0 52.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.):	1.0 3 285.0 118.0 52.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):	1.0 3 285.0 118.0 52.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):	1.0 3 285.0 118.0 52.0
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months):	1.0 3 285.0 118.0 52.0 1 1
Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months): Development Lead Time Variable (months):	1.0 3 285.0 118.0 52.0 .1 1

Subsystem: All except Dual Spin Configurations: Horizon Sensor (with electronics) Equipment Type: (Planar scan type) Performance Technical Characteristics Sensor noise  $(3\sigma)$ : 4.36 mrad (0.250 deg) Radiance irregularity (3σ): 2.62 mrad (0.150 deg) (2)Quantization error  $(3\sigma)$ : 0.44 mrad (0.025 deg) (3) Sun interference  $(3\sigma)$ : (4)Moon interference  $(3\sigma)$ : (5) Threshold aging (3 $\sigma$ ): (6) Null or bias error  $(3\sigma)$ : (7) Maximum output frequency: 1.256 rad/sec (8) (9) (10)Power. Average Power (watts): 5.5 Maximum Power (watts): 8.0 2.5 Minimum Power (watts): Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter C 01 (1401) Requirement (flag): 2.87 (6.33 lb) Weight (kg):  $4.2 \times 10^3$  (0.15 ft<sup>3</sup>) Volume (cc): Vibration 1 Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 311 (100° F) Minimum (<sup>o</sup>K):  $255 ( 0^{\circ} F)$ Pressure (kg/m<sup>2</sup>):

S&C (1201)

CDPI	
Power Switching Commands (No.)	1
Time Tagged Commands (No.):	•
Other Commands (No.):	1
High Rate Telemetry	
Analog Points (No.):	18,
Digital Points (No.):	
Sample Rate (sec -1):	.25
Word Length (bits):	8
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	. 1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	5166
Standard Deviation (x 10 <sup>+9</sup> hr):	•
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	4
Cost	
Design Engineering (\$1000):	1250.0
Test and Evaluation (\$1000):	355.0
Unit Production (\$1000):	105.0
Reference Quantity (No.):	2
Factor (N.D.):	1
Schedule	t
.Development Lead Time Constant (months):	11. 6
Development Lead Time Variable (months):	9.9
Qualification Lead Time Constant (months):	9. 4
Qualification Lead Time Variable (months):	. 4.2
State-of-Art Factor (N.D.):	1.0

Subsystem: S&C (1301)

Configurations: Yaw Spin. and ME with Momentum. Wheel

Equipment Type: Reaction Wheel Assembly (with electronics)

### Performance

### Technical Characteristics

(1) Nominal momentum: 42.58 m-kg-sec (308.0 ft-lb-sec)

(2) Maximum momentum: 51.10 m-kg-sec (369.6 ft-lb-sec)

(3) Minimum momentum: 34.07 m-kg-sec (246.4 ft-lb-sec)

0

(4) Nominal speed: 3000 rpm

(5) Maximum speed: 3600 rpm

(6) Minimum speed: 2400 rpm

(7)

(8)

(9)

(10)

### Power

Average Power (watts): 19.6

Maximum Power (watts): 125.0

Minimum Power (watts):

Nominal Voltage (volts): 28.0

Maximum Voltage (volts): 33.0 ...

Minimum Voltage (volts): 21.5

Converter/Inverter

Requirement (flag): C 01 (1401)

Weight (kg): 35.54 (78.35 lb)

Volume (cc):  $7.1 \times 10^4$  (2.5 ft<sup>3</sup>)

### Vibration

Random (g, rms):

Non-Random (g):

### Temperature

Maximum (<sup>o</sup>K): 316 (110<sup>o</sup> F)

Minimum ( $^{\circ}$ K): 272 (  $30^{\circ}$  F)

Pressure (kg/m<sup>2</sup>):

### CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): Other Commands (No.): 1 High Rate Telemetry 5 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 8 . Low Rate Telemetry 7 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 500 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): 3 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 430.( Test and Evaluation (\$1000): 390. ( Unit Production (\$1000): 122.( 1 Reference Quantity (No.):. 1 Factor (N.D.): Schedule 7. 1 Development Lead Time Constant (months): 3.0 Development Lead Time Variable (months): 3.2 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0.4 State-of-Art Factor (N.D.): 1.0

Subsystem: S&C (1401) Configurations: A11 Equipment Type: Power Converter Performance ' Technical Characteristics (1) Special requirement code: C 01 (2) (3) (4)(5) (6) (7)(8)(9) (10)Power 10.6 Average Power (watts): 15.0 Maximum Power (watts): 7.5 Minimum Power (watts): 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32.0 22.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 2.31 (5.09 lb) Weight (kg):  $5.1 \times 10^3 \ (0.18 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Tempe rature 311 (100° F) Maximum (<sup>o</sup>K):  $266 (20^{\circ} F)$ Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

### CDPI 7 Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 3 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 7 Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec 1): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 4033 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): 4 Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): 0 CER Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule 7.4 Development Lead Time Constant (months): Development Lead Time Variable (months): 3.2 Qualification Lead Time Constant (months): 2, 5 0.3 Qualification Lead Time Variable (months):

Performance (continued)

State-of-Art Factor (N.D.):

1.0

Subsystem: S&C (1501) Configurations: Mass Expulsion Equipment Type: Attitude Reference Electronics (3 axis gyrocompassing) Performance Technical Characteristics  $0.01667 \text{ sec}^{-1}$ (1) Pitch horizon scanner gain: (2) Roll horizon scanner gain to roll axis: 0.00556 sec<sup>-1</sup>  $0.01667 \text{ sec}^{-1}$ (3) Roll horizon scanner gain to yaw axis:  $0.01667 \text{ sec}^{-1}$ (4) Pitch feedback gain:  $0.00556 \text{ sec}^{-1}$ (5) Roll feedback gain: 0.01667 sec<sup>-1</sup> (6) Roll to yaw coupling gain: (7) (8) (9) (10)Power Average Power (watts): 4.0 Maximum Power (watts): 6.0 Minimum Power (watts): 2.0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 4.5 (10.0 lb)  $2.8 \times 10^4 \ (1.0 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature

Pressure (kg/m<sup>2</sup>):

Maximum (<sup>o</sup>K):

Minimum (<sup>o</sup>K):

322 (120° F)

266 (20° F)

### CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): Other Commands (No.): 20 High Rate Telemetry Analog Points (No.): 9 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 13 Low Rate Telemetry Analog Points (No.): 23 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 14 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 10,000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): 800.0 Test and Evaluation (\$1000): 530.0 137.0 Unit Production (\$1000): Ž Reference Quantity (No.): 1 Factor (N.D.): Schedule 11.0 Development Lead Time Constant (months): 9.5 Development Lead Time Variable (months): 5.5 Qualification Lead Time Constant (months): 1.3 Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

Subsystem: S&C (1601) Configurations: A11 Equipment Type: Valve Driver Assembly Performance Technical Characteristics (1) Number of valves: 6 (2) (3) (4)(5) (6) (7)(8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 12.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 0.73 (1.6 lb) Weight (kg):  $4.5 \times 10^3$  (0.16 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 322 (120° F) Maximum (<sup>o</sup>K): 266 (20° F) Minimum (<sup>0</sup>K): Pressure (kg/m<sup>2</sup>):

### CDPI Power Switching Commands (No.): 2 Time Tagged Commands (No.): 8 Other Commands (No.): High Rate Telemetry 13 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): 4 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1900 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 4 Cost 40.0 Design Engineering (\$1000): 30.0 Test and Evaluation (\$1000): 10.0 Unit Production (\$1000):. 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule 2.6 Development Lead Time Constant (months): 1.1 Development Lead Time Variable (months): 3.0 Qualification Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

0.3

1.0

Subsystem: S&C (1701) All Mass Expulsion Configurations Configurations: Equipment Type: Rate Integrating Gyro Assembly (with electronics) (3 gyros per assembly) Performance Technical Characteristics  $2.43 \times 10^{-3}$  mrad/sec (0.000139) G-insensitive gyro drift(30): Total misalignment relative to vehicle (3 $\sigma$ ):

O. 87 x 10<sup>-3</sup> mrad (0.05 deg) Gyro scale factor error (N. D): 0.02 x 10<sup>-3</sup> (0.001) (2) (3) (4)(5)(6)(7)(8)(9) (10)Power Average Power (watts): 18.0 Maximum Power (watts): 27.0 Minimum Power (watts): 9.0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 6.8 (15.0 lb)  $8.5 \times 10^3$  (0.3 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 311 (100°F) Minimum (<sup>o</sup>K): 278 ( 40° F) Pressure (kg/m<sup>2</sup>):

CDPI	
Power Switching Commands (No.):	1
Time Tagged Commands (No.):	
Other Commands (No.):	1
High Rate Telemetry	
Analog Points (No.):	. 3
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits):	8
Low Rate Telemetry	
Analog Points (No.):	6 '
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety .	
Failure Model (flag):	1
Failure Parameters	
Failure Parameters  Failure Rate or Mean (x 10 <sup>±9</sup> hr):	15,000
. <u></u>	15,000
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	15,000
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr):	
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.):	1.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):	1.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost	1.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000):	1.0 4 742.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000):	1.0 4 742.0 355.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000):	1.0 4 742.0 355.0 151.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.):	1.0 4 742.0 355.0 151.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):	1.0 4 742.0 355.0 151.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule	1.0 4 742.0 355.0 151.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months):	1.0 4 742.0 355.0 151.0 1
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months): Development Lead Time Variable (months):	1.0 4 742.0 355.0 151.0 1 1

Subsystem: S&C (1702) Configurations: All Mass Expulsion Configurations Rate Integrating Gyro Assembly (with electronics) Equipment Type: Performance Technical Characteristics  $2.41 \times 10^{-4} \text{mrad/sec} (0.0000138)$ G-insensitive gyro drift  $(3\sigma)$ : (1)deg/sec) Total misalignment relative (2) to vehicle (3 $\check{\sigma}$ ): 0.87 mrad (0.05 deg) (3) Gyro scale factor error (N.D.): 0.002 (0.0001) (4)(5) (6) (7)(8)(9)(10)Power Average Power (watts): 27.0 Maximum Power (watts): 36.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 10.4 (23.0 lb) Weight (kg):  $1.2 \times 10^4 \ (0.41 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 311 (100° F)  $278 (40^{\circ} F)$ Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

### CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): Other Commands (No.): 1 High Rate Telemetry 3 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 8. Low Rate Telemetry Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 15;000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 4 Total Redundant Elements (No.): Cost 970. C Design Engineering (\$1000): Test and Evaluation (\$1000): 480.0 205.0 Unit Production (\$1000): 1 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 10.5 Development Lead Time Variable (months): 3.0 Qualification Lead Time Constant (months): 8.3 Qualification Lead Time Variable (months): 0:6 State-of-Art Factor (N.D.): 1.0

Subsystem: S&C (1801)

Configurations: All except Dual Spin

Equipment Type: Horizon Sensor (with electronics)

### Performance

### Technical Characteristics

(1) Sensor noise (3σ):	4.36 mrad (0.250 deg)
------------------------	-----------------------

(3) Quantization error (deg,  $3\sigma$ ):

(7) Null or bias error (deg,  $3\sigma$ ):

(9)

(10).

### Power

Average F	Power (	(watts)	):	15.0	)

Converter/Inverter

Requirement (flag):

Volume (cc): 
$$5.7 \times 10^4$$
 (2.0 ft<sup>3</sup>)

### Vibration

Random (g, rms):

Non-Random (g):

### Temperature

Minimum 
$$({}^{O}K)$$
: 255  $({}^{O}F)$ 

Pressure (kg/m<sup>2</sup>):

### CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): Other Commands (No.): 1 High Rate Telemetry Analog Points (No.): 18 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec 1): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 10,000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 3 Cost 2210.0 Design Engineering (\$1000): 760.0 Test and Evaluation (\$1000): Unit Production (\$1000): 250.0 Reference Quantity (No.): 2 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 11.6 Development Lead Time Variable (months): 14.7 Qualification Lead Time Constant (months): 9.4

7.6

1.0

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

Subsystem: S&C (1901) . Configurations: Mass Expulsion with Control Moment Gyros Equipment Type: Electronic Processor Assembly Performance Technical Characteristics (1)(2) (3) (4)(5) (6) (7) (8) (9) (10)Power Average Power (watts): 26.5 Maximum Power (watts): 30.0 Minimum Power (watts): 15.0 Nominal Voltage (volts): -28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 4.67 (10.3 lb)  $2.92 \times 10^4$  (1.03 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 322 (120° F) Maximum (<sup>o</sup>K): Minimum (<sup>0</sup>K): 266 ( 20° F)

Pressure (kg/m<sup>2</sup>):

### CDPI Power Switching Commands (No.): 2 Time Tagged Commands (No.): Other Commands (No.): 40 High Rate Telemetry Analog Points (No.): 18: Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 13 Low Rate Telemetry Analog Points (No.): 46 Digital Points (No.): . Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 14 Safety Failure Model (flag): 1 Failure Parameters 6000 Failure Rate or Mean (x 10<sup>±9</sup> hr): Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): 810.0 · 520.0 Test and Evaluation (\$1000): Unit Production (\$1000): 140.0 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 11.0 Development Lead Time Variable (months): 4.7 5.5 Qualification Lead Time Constant (months):

0.6

2.0

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

Subsystem: S&C (2001)

Configurations: Mass Expulsion with Control Moment Gyros

Equipment Type: Single Gimbaled Control Moment Gyro

### Performance

### Technical Characteristics

(1) CMG momentum: 69. 1 m-kg-sec (500 ft-lb-sec)

(2) Peak gimbal rate: 1 rad/sec

(3) Peak torquer torque: 85.4 N-m (63 ft-lb)

(4)

(5)

(6)

(7)

(8)

(9)

(10)

### Power

Average Power (watts): 30.8

Maximum Power (watts): 100.0

Minimum Power (watts): 0

Nominal Voltage (volts): 28.0

Maximum Voltage (volts): 32.0

Minimum Voltage (volts): 24.0

Converter/Inverter Requirement (flag):

Weight (kg): 77.1 (170.0 lb)

Volume (cc):  $1.7 \times 10^5$  (6.0 ft<sup>3</sup>)

Vibration

Random (g, rms):

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 311 (100<sup>o</sup> F)

Minimum (<sup>o</sup>K): 278 (40<sup>o</sup>F)

Pressure (kg/m<sup>2</sup>):

### CDPI Power Switching Commands (No.): 2 Time Tagged Commands (No.): Other Commands (No.): 2 High Rate Telemetry Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec 1): 125 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): 12 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): ·870 ' Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 Total Redundant Elements (No.): 12 Cost Design Engineering (\$1000): 2000.0 Test and Evaluation (\$1000): 1500.0 Unit Production (\$1000): 1000.0 . Reference Quantity (No.): 4 1 .. . Factor (N.D.): Schedule Development Lead Time Constant (months): 24.0 Development Lead Time Variable (months): 10.0 Qualification Lead Time Constant (months): 8.0 Qualification Lead Time Variable (months): . 4.8 State-of-Art Factor (N.D.): 2.0

Subsystem: S&C (2101) Configurations: Mass Expulsion with Control Moment Gyros Equipment Type: Star Sensor Assembly (with electronics) Performance Technical Characteristics (1) 1 Type (2)Sensor accuracy  $(3\sigma)$ : 1.7 mrad (0.1 deg) 30.5 mrad<sup>2</sup> (100 deg<sup>2</sup>) (3) Mapper field of view: (4)Mapper sensitivity (visual magnitude): 2 (5) (6) (7)(8)(9) (10)Power Average Power (watts): 5.5 Maximum Power (watts): 7.0 Minimum Power (watts): 3.0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 3.2 (7.0 lt  $1.5 \times 10^4 \ (0.53 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 322 (120°F) Minimum (<sup>o</sup>K):  $266 (20^{\circ} F)$ 

Pressure (kg/m<sup>2</sup>):

CDPI	
Power Switching Commands (No.):	1
Time Tagged Commands (No.):	
Other Commands (No.):	1
High Rate Telemetry	٠.
Analog Points (No.):	18
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits):	8 .
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	
rande ratameters	
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	3000
	3000
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	3000
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr):	•
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.):	.0.5
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):	.0.5
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost	0.5
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000):	.0.5
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>±9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000):	.0.5 .3 .420.0 625.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000):	0.5 3 420.0 625.0 115.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>±9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.):	0.5 3 420.0 625.0 115.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>±9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):	0.5 3 420.0 625.0 115.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>±9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule	0.5 3 420.0 625.0 115.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>±9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months):	0.5 3 420.0 625.0 115.0 1
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>±9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months): Development Lead Time Variable (months):	0.5 3 420.0 625.0 115.0 1
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months):	0.5 3 420.0 625.0 115.0 1 1 10.0 8.0 7.0

Subsystem: S&C (2102) Configurations: Mass Expulsion with Control Moment Gyros Equipment Type: Star Sensor Assembly (with electronics) Performance Technical Characteristics 2 (1)Type: 0.87 mrad (0.05 deg) Sensor accuracy  $(3\sigma)$ : (2)  $122 \text{ rad}^2 (400 \text{ deg}^2)$ Mapper field of view: (3) Mapper sensitivity (visual magnitude): 4 (4)(5) (6) (7) (8) (9) (10)Power Average Power (watts): 5.0 Maximum Power (watts): 10.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 7.03 (15.5 lb)  $4.39 \times 10^4$  (1.55 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Tempe rature Maximum (<sup>o</sup>K): 322 (120° F) Minimum (<sup>o</sup>K): 266 ( 20° F)

## Performance (continued)

CDPI .	
Power Switching Commands (No.):	. 1
Time Tagged Commands (No.):	
Other Commands (No.):	1
High Rate Telemetry	
Analog Points (No.):	18
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits):	8
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	3000
Standard Deviation (x $10^{+9}$ hr):	•
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	3 .
Cost	
Design Engineering (\$1000):	600.0
Test and Evaluation (\$1000):	800.0
Unit Production (\$1000):	175.0
Reference Quantity (No.):	1
Factor (N.D.):	1
Schedule	•
Development Lead Time Constant (months):	10.0
Development Lead Time Variable (months):	8.0
Qualification Lead Time Constant (months):	7.0
Qualification Lead Time Variable (months):	1.6
State-of-Art Factor (N.D.):	1.5

S&C (2103) Configurations: Mass Expulsion with Control Moment Gyros Equipment Type: Star Sensor Assembly (with electronics) Performance Technical Characteristics (1)Type: 3 (2)Sensor accuracy (3 $\sigma$ ): 0.05 mrad (0.003 deg) 8.54 rad  $(28 \text{ deg}^2)$ Mapper field of view: (3) (4)Mapper sensitivity (visual magnitude): (5) (6) (7)(8)(9) (10)Power Average Power (watts): 8.0 Maximum Power (watts): 12.0 Minimum Power (watts): 4.0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 10.4 (23.0 lb)  $1.4 \times 10^4 \ (0.49 \text{ ft}^3)$ Volume (cc): Vibration : Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 322 (120°F) Minimum (<sup>o</sup>K): 266 ( 20° F)

Subsystem:

### Performance (continued)

# CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety

,		_
Failure Model (	flag):	1

1

1

18

125

8

2

1 8 .

0

Failure Parameters

Failure Rate or Mean (x 10 <sup>±9</sup> hr):	10,000
Standard Deviation (x 10 <sup>+9</sup> hr):	
Dormancy Factor (N.D.):	1.

3 Total Redundant Elements (No.):

#### Cost

Design Engineering (\$1000):	750.0
Test and Evaluation (\$1000):	1000.0
Unit Production (\$1000):	225.0
Reference Quantity (No.):	1
Factor (N.D.):	1

#### Schedule

Development Lead Time Constant (months):	10.0
Development Lead Time Variable (months):	8.0
Qualification Lead Time Constant (months):	, 7.0
Qualification Lead Time Variable (months):	1.6
State-of-Art Factor (N.D.):	1.5

S&C (2201) Subsystem: Configurations: Mass Expulsion with Momentum Wheel Equipment Type: Electronic Error Processor Performance Technical Characteristics (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)Power Average Power (watts): 4.0 Maximum Power (watts): 6.0 Minimum Power (watts): 2.0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 4.5 (10.0 lb)  $2.8 \times 10^4 (1.0 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g):

Temperature

Maximum (°K): 322 (120° F)

Minimum (°K): 266 ( 20° F)

#### Performance (continued)

#### CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): Other Commands (No.): 20 High Rate Telemetry Analog Points (No.): 9 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): Low Rate Telemetry Analog Points (No.): 23 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): ı١ Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 23,000 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): 4 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 800.0 Test and Evaluation (\$1000): 530.0 Unit Production (\$1000): 138.0 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 11.0 Development Lead Time Variable (months): 9.0 Qualification Lead Time Constant (months): 5.5 Qualification Lead Time Variable (months): 1.2 State-of-Art Factor (N.D.): 1.5

Subsystem: APS (0101)	
Configurations: Cold Gas	
Equipment Type: Thruster (Fairchi	ld 683000)
Performance	
Technical Characteristics	
(1) Thrust level:	0.22 N (0.05 lb)
(2) Pulse life:	150,000 cycles
(3) Inlet pressure:	$2.9 \times 10^5 \cdot \text{N/m}^2$ (42 psia)
(4) Total impulse (lb-sec)*:	·
(5) - ISP (sec)*:	
(6) Mixture ratio (N. D.)**:	
(7)	
(8)	
(9)	
(10)	
Power	
Average Power (watts):	1. 0
Maximum Power (watts):	25.0
Minimum Power (watts):	0
Nominal Voltage (volts):	28.0
Maximum Voltage (volts):	32. 0
Minimum Voltage (volts):	24.0
Converter/Inverter Requirement (flag):	•
Weight (kg):	0.34 (0.75 lb)
Volume (cc):	$2.1 \times 10^3 (0.075 \text{ ft}^3)$
Vibration	
Random (g, rms):	22.3
Non-Random (g):	

### Temperature

339 (150°F) Maximum (<sup>o</sup>K): Minimum (<sup>o</sup>K):
Pressure (kg/m<sup>2</sup>): 211 (-80°F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr). Dormancy Factor (N.D.): 1.0 16 Total Redundant Elements (No.): Cost 121.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 30.0 9.0 Unit Production (\$1000): 3 Reference Quantity (No.): ຸ 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 2.5 Development Lead Time Variable (months): 1.0 Qualification Lead Time Constant (months): 1.0 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0102)

Configurations: Cold Gas

Equipment Type: Thruster (Hydraulic Research 48001770)

#### Performance

#### Technical Characteristics

(1)	Thrust level:	0.22 N	(0.05	1b)

(2) Pulse life: 250,000 cycles

(3) Inlet pressure:  $6.89 \times 10^{\frac{5}{5}} \text{ N/m}^2$  (100 psia)

(4) Total impulse (lb-sec)\*:

(5) ISP (sec)\*:

(6) Mixture ratio (N.D.)\*\*:

(7)

(8)

(9)

(10)

#### Power

Average Power (watts): 1.0 Maximum Power (watts): 25.0

Minimum Power (watts): 0

Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0

Minimum Voltage (volts): 24.0

Converter/Inverter Requirement (flag):

Weight (kg): 0.14 (0.3 ib)

Volume (cc): 850 (0.03 ft<sup>3</sup>)

#### Vibration

Random (g, rms):

Non-Random (g):

#### Temperature

Maximum (<sup>o</sup>K): 339 (150<sup>o</sup> F) Minimum (<sup>o</sup>K): 233 (-40<sup>o</sup> F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 Total Redundant Elements (No.): 16 Cost Design Engineering (\$1000): 61.0 15.0 Test and Evaluation (\$1000): Unit Production (\$1000): 4. 2 ,3´ · Reference Quantity (No.): Factor (N.D.): ľ Schedule Development Lead Time Constant (months): 2.5 Development Lead Time Variable (months): 0.7 Qualification Lead Time Constant (months): 1.0 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

Subsystem	:	APS	(0103)			
Configurati	ions:	Cold	Gas ,			
Equipment	Type:	Thru	ster (Sterer	51350)		
Performan	се	-				
Technic	al Char	acter	istics			
(1)	Thrust	level	. <b>:</b>	0.22 N (	(0.05 lb)	ı
(2)	Pulse	life:	•	500,000	cycles	
(3)	•			$2.9 \times 10^{5}$	$5  \mathrm{N/m}^2$	(42 psia)
(4)	Total i	mpuls	se (lb-sec)*:			
(5)	ISP (se	ec)*:				
(6)	Mixtur	e rati	o (N.D.)**:			
(7)						
(8)						
(9)						
(10)						
Power						
Aver	age Pov	ver (w	vatts):	1.0		
Maxi	mum Po	ower	(watts):	11.0		
Minimum Power (watts):		0				
Nominal Voltage (volts):		28.0				
Maximum Voltage (volts):			32.0			
Minir	num Vo	ltage	(volts):	24.0		
	erter/Ir qui reme					
Weight (	kg):			0.2 (0.4	1b)	
Volume	(cc):			$1.1 \times 10^3$	(0.04	ft <sup>3</sup> )
Vibratio	n					

Random (g, rms): 7.28

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 344 (160<sup>o</sup> F) Minimum (<sup>o</sup>K): 233 (-40<sup>o</sup> F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): 1:0 Dormancy Factor (N.D.): Total Redundant Elements (No.): 16 Cost Design Engineering (\$1000): 75.0 Test and Evaluation (\$1000): 19.0 Unit Production (\$1000): 5.5 Reference Quantity (No.): 3 ͺ Factor (N.D.): . 1 Schedule Development Lead Time Constant (months): 2.5 Development Lead Time Variable (months): 0.7 Qualification Lead Time Constant (months): 1.0. Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0104)

Configurations: Cold Gas

Equipment Type: Thruster (Sterer 51340)

#### Performance

### Technical Characteristics

(1) Thrust level: 13 N (3.0 lb)

(2) Pulse life: 10,000 cycles

(3) Inlet pressure:  $1.38 \times 10^6 \text{ N/m}^2$  (200 psia

(4) Total impulse (lb-sec)\*:

(5) ISP (sec)\*:

(6) Mixture ratio (N.D.)\*\*:

(7)

(8)

(9)

(10)

#### Power

Average Power (watts): 1.0

Maximum Power (watts): 40.0

Minimum Power (watts): 0

Nominal Voltage (volts): 28.0

Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0

Converter/Inverter Requirement (flag):

Weight (kg): 0.3 (0.7 lb)

Volume (cc):  $2.0 \times 10^3$  (0.07 ft<sup>3</sup>)

Vibration

Random (g, rms): 7.5

Non-Random (g):

Temperature

Maximum (°K): 353 (176°F).

Minimum (°K): 255 ( 0°F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec-1). Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec-1) Word Length (bits): Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 16 Total Redundant Elements (No.): Cost 115.0 Design Engineering (\$1000): 115.0 Test and Evaluation (\$1000): 8.7 Unit Production (\$1000): 3 Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): 2.5 Development Lead Time Variable (months): 1.0 Qualification Lead Time Constant (months): 1.0 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0105) Configurations: Cold Gas Equipment Type: Thruster (Valcor 27200-511) Performance Technical Characteristics (1) Thrust level: 13 N (3, 0 lb) (2) Pulse life: 5,000 cycles  $3.1 \times 10^5 \text{ N/m}^2$  (45 psia) (3) Inlet pressure: (4)Total impulse (lb-sec)\*: (5) ISP (sec)\*: Mixture ratio (N.D.) \*\*: (6) (7) (8)(9)(10)Power Average Power (watts): 1.0 Maximum Power (watts): 32.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 0.45 (1.0 lb)  $2.8 \times 10^3 \ (0.1 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): 18.5 Non-Random (g): Temperature Maximum (<sup>o</sup>K): 344 (160° F)

Minimum (<sup>o</sup>K):  $239 (-30^{\circ} F)$ 

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec-1): Word Length (bits): Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 Total Redundant Elements (No.): 16 Cost Design Engineering (\$1000): 150.0 Test and Evaluation (\$1000): 150.0 Unit Production (\$1000): 11.5 Reference Quantity (No.): Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 2.5 Development Lead Time Variable (months): 1:1 . . Qualification Lead Time Constant (months): 1.0 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0106)Configurations: Cold Gas Equipment Type: Thruster (Sterer 51330) Performance Technical Characteristics Thrust level: 66. 7 N (15. 0 lb) (2) Pulse life: 10,000 cycles  $1.38 \times 10^6 \, \text{N/m}^2$  (200 psia) (3) Inlet pressure: (4)Total impulse (lb-sec)\*: (5) ISP (sec)\*: (6)Mixture ratio (N.D.)\*\*: (7)(8) (9)(10)Power Average Power (watts): 1.0 32.0 Maximum Power (watts): Minimum Power (watts): 0, Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 0.64 (1.4 lb) Weight (kg):  $4.0 \times 10^3$  (0.14 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Tempe rature 366 (200°F) Maximum (<sup>o</sup>K): 233 (-40° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 16 Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost 193.0 Design Engineering (\$1000): 193.0 . Test and Evaluation (\$1000): 15.0 Unit Production (\$1000): Reference Quantity (No.): 3 1 Factor (N.D.): Schedule 2.5 Development Lead Time Constant (months): 1: 2 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 1.0 Qualification Lead Time Variable (months): :0.1 1.0. State-of-Art Factor (N.D.):

APS (0107) Subsystem: . Configurations: Cold Gas Equipment Type: Thruster (Kidde 872458) Performance Technical Characteristics (1) Thrust level: 133 N (30.0 lb) (2) Pulse life: 20,000 cycles  $2.24 \times 10^7 \text{ N/m}^2$  (3250 psia) (3) Inlet pressure: Total impulse (lb-sec)\*: (5) ISP (sec)\*: Mixture ratio (N.D.) \*\*: (7) (8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 34.0 Minimum Power (watts): 0 Nominal Voltage (volts): '28, 0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 1.3 (2.8 lb)  $8.5 \times 10^3$  (0.3 ft<sup>3</sup>) Volumė (cc): Vibration Random (g, rms): Non-Random (g): Temperature 344 (160°F) Maximum (<sup>o</sup>K): Minimum (<sup>o</sup>K): 219 (-65° F) Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): 16 Total Redundant Elements (No.): Cost 324.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 324.0 26.0 Unit Production (\$1000): 3 Reference Quantity (No.): Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 2.5 Development Lead Time Variable (months): 1.5 Qualification Lead Time Constant (months): . 1. 0 Qualification Lead Time Variable (months): 0.2 State-of-Art Factor (N.D.): 1.0

APS (0108) Subsystem: ·Cold Gas Configurations: Equipment Type: Thruster (Sterer 31980) Performance Technical Characteristics 133 N (30.0 Ib) (1)Thrust level: Pulse life: (2) 100,000 cycles  $1.38 \times 10^7 \,\mathrm{N/m}^2$  (2000 psia) (3) Inlet pressure: Total impulse (lb-sec)\*: (4) ISP (sec)\*: (5) Mixture ratio (N.D.)\*\*: (6) (7)(8) (9)  $(10)^{-}$ Power 1.0 Average Power (watts): Maximum Power (watts): 37.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): Weight (kg): 0.95 (2.1 lb)

Volume (cc):  $5.9 \times 10^3$  (0.21 ft<sup>3</sup>)

Vibration

Random (g, rms):

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 344 (160<sup>o</sup> F) Minimum (<sup>o</sup>K): 233 (-40<sup>o</sup> F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) **CDPI** Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): . 16 Total Redundant Elements (No.): Cost 261.0 Design Engineering (\$1000): 261.0 Test and Evaluation (\$1000): ~20, 8 Unit Production (\$1000): 3- 1. Reference Quantity (No.): 1 Factor (N.D.): Schedule 2, 5 Development Lead Time Constant (months): 1. 6 Development Lead Time Variable (months): Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 1.0

State-of-Art Factor (N.D.):

Subsystem: APS (0109) Configurations: Cold Gas Thruster (Valcor 27200) Equipment Type: Performance Technical Characteristics Thrust level: (1)133 N (30.0 lb) Pulse life: 5000 cycles (2)  $2.068 \times 10^7 \, \text{N/m}^2 \, (3000 \, \text{psia})$ Inlet pressure: (3)(4)Total impulse (lb-sec)\*: ISP (sec) \*: (5) Mixture ratio (N.D.)\*\*: (6) (7) (8)(9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 45.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24. 0 Converter/Inverter Requirement (flag): Weight (kg): 0.23 (0.51 lb)  $\hat{5.7} \times \hat{10}^3 \quad (0.2 \text{ ft}^3)$ Volume (cc): Vibration

18.5 Random (g, rms):

Non-Random (g):

Tempe rature

 $344 (160^{\circ} F)$ Maximum (<sup>o</sup>K): 219 (-65°F) Minimum (<sup>o</sup>K):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 Total Redundant Elements (No.): 16. Cost Design Engineering (\$1000): 91.0 91.0 Test and Evaluation (\$1000): 6.8 Unit Production (\$1000): 3 Reference Quantity (No.): 4 Factor (N.D.): Schedule Development Lead Time Constant (months): 2.5 1.6 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 1.0 Qualification Lead Time Variable (months): 0.2 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0201) Configurations: Cold Gas Equipment Type: Isolation Valve (latching solenoid) (Valcor 272000-454) Performance Technical Characteristics  $2.413 \times 10^7 \text{ N/m}^2$  (3500 psia) Maximum pressure:  $1.6 \times 10^{-2} \text{ cm}^2 (0.0025 \text{ in}^2)$ (2) Flow area: (3) (4)(5) (6)(7)(8)(9) (10)Power. 0 Average Power (watts): Maximum Power (watts): 30.0 . Minimum Power (watts): ..0. Nominal Voltage (volts): 28.0-**32.** 0 Maximum Voltage (volts): Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 0.23 (0.50·1b)  $1.4 \times 10^3$  (0.05 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): 18, 5 Non-Random (g): Tempe rature Maximum (<sup>o</sup>K): 333 (140°F) Minimum (<sup>o</sup>K): 233 (-40° F)

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): *;*] High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 70 . Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 1 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 0 Test and Evaluation (\$1000): 0 CER Unit Production (\$1000): Reference Quantity (No.): 1. Factor (N.D.): Schedule 0 Development Lead Time Constant (months): Development Lead Time. Variable (months): 0 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0202) Configurations: Cold Gas Equipment Type: Isolation Valve (latching solenoid) (Sterer 51570) Performance Technical Characteristics.  $3.172 \times 10^7 \text{ N/m}^2$  (4600 psia) (1)Maximum pressure:  $0.12 \text{ cm}^2 (0.018 \text{ in}^2)$ Flow area: (2)(3) (4)(5) (6) (7)(8)(9)(10)Power Average Power (watts): 0 Maximum Power (watts): 51.0 0 Minimum Power (watts): Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 1. 1 (2.5 lb) Weight (kg):  $7.1 \times 10^3$  (0.25 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): 7.3 Non-Random (g): Temperature Maximum (<sup>o</sup>K): 339 (150°F) Minimum (OK): 233 (-40° F)

# CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 1 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 70 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 Total Redundant Elements (No.): 1 Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): CER Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months) Development Lead Time Variable (months) 0 Qualification Lead Time Constant (months) 0 Qualification Lead Time Variable (months) 0. State-of-Art Factor (N.D.):

Performance (continued)

1.0

Subsystem: APS (0203)

Configurations: Cold Gas

Equipment Type: Isolation Valve (pyrotechnic) (Pyrotechnics 1436-7)

#### Performance

#### Technical Characteristics

- (1) Maximum pressure:  $2.413 \times 10^7 \text{ N/m}^2$  (3500 psia)
- (2) Flow area:  $0.14 \text{ cm}^2 (0.022 \text{ in}^2)$
- (3)
- (4)
- (5)
- (6)
- (7)
- (8)
- (9)
- (10)

#### Power

Average Power (watts): 0

Maximum Power (watts): 12.0

Minimum Power (watts): 0

Nominal Voltage (volts): 28.0

Maximum Voltage (volts): 32.0

Minimum Voltage (volts): 24.0

Converter/Inverter Requirement (flag):

Weight (kg): 0.16 (0.35 lb)

Volume (cc):  $1.1 \times 10^3$  (0.04 ft

Vibration

Random (g, rms): 16.9

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 344 (160<sup>o</sup> F)

Minimum (<sup>o</sup>K): 219 (-65 °F)

```
Performance (continued)
    CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
       Other Commands (No.):
                                                   1
       High Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
          Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
Safety
                                                   1
   Failure Model (flag):
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                100
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                   1. 0
   Total Redundant Elements (No.):
                                                   1
Cost
   Design Engineering ($1000):
                                                   0
                                                   0
   Test and Evaluation ($1000):
                                                         CER
   Unit Production ($1000):
                                                   0
   Reference Quantity (No.):
                                                   1
                                                  . 1
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months): 0.
   Development Lead Time Variable (months):
                                                  0
   Qualification Lead Time Constant (months):
   Qualification Lead Time Variable (months):
                                                  0
   State-of-Art Factor (N.D.):
                                                   1.0
```

Subsystem: APS (0204) Configurations: Cold Gas Equipment Type: Isolation Valve (latching solenoid) (Valcor V27700) Performance Technical Characteristics  $2.069 \times 10^7 \text{ N/m}^2$  (3000 psia) (1)Maximum pressure: 23.6 cm $^2$  (3.66 in $^2$ ) (2)Flow area: (3)(4)(5) (6) (7)(8) (9) (10)Power Average Power (watts): . 0 Maximum Power (watts): 110.0 Minimum Power (watts): 0. Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter

Requirement (flag):

2.7 (6.0 lb) Weight (kg):

 $1.7 \times 10^4 \ (0.6 \text{ ft}^3)$ Volume (cc):

Vibration

Random (g, rms):

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 344 (160°F) Minimum (<sup>o</sup>K): 219 (-65° F)

```
Performance (continued)
    CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
       Other Commands (No.):
       High Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
          Sample Rate (sec<sup>-1</sup>):
          Word Length (bits):
       Low Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
          Word Length (bits):
Safety
   Failure Model (flag):
                                                      1
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                    70
      Standard Deviation (x 10<sup>+9</sup> hr):
                                                      1.0
      Dormancy Factor (N.D.):
   Total Redundant Elements (No.):
                                                     <sup>'</sup> 1
Cost
   Design Engineering ($1000):
                                                     0
   Test and Evaluation ($1000):
   Unit Production ($1000):
                                                           CER
                                                     0
   Reference Quantity (No.):
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months):
                                                     0
   Development Lead Time Variable (months):
                                                     0
   Qualification Lead Time Constant (months):
                                                     0
   Qualification Lead Time Variable (months):
                                                     0
  State-of-Art Factor (N.D.):
                                                     1.0
```

Subsystem: APS (0301)

Configurations: Cold Gas

Equipment Type: Filter (APM AC-A370-6)

#### Performance

#### Technical Characteristics

 $2.758 \times 10^7 \, \text{N/m}^2$  (4000 psia) (1) Maximum pressure:

1.  $0 \times 10^{11} \text{ N/(kg-m)}^2$  (3.  $0 \times 10^6 \text{ psi}$  sec<sup>2</sup>/lb<sup>2</sup>) (2) Flow resistance:

(3)

(4)

(5)

(6)

(7)

(8)

(9)

(10)

#### Power

Average Power (watts): NA

Maximum Power (watts): NA

Minimum Power (watts): NA

Nominal Voltage (volts): NΆ

Maximum Voltage (volts): NA

Minimum Voltage (volts): NA

Converter/Inverter Requirement (flag):

Weight (kg): 0.41 (0.91 lb)

 $2.8 \times 10^3 \ (0.1 \text{ ft}^3)$ Volume (cc):

Vibration

Random (g, rms): 18.5

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 344 (160°F)

Minimum (<sup>o</sup>K): 219  $(-65^{\circ} \text{ F})$ 

```
Performance (continued)
     CDPI
        Power Switching Commands (No.):
        Time Tagged Commands (No.):
       Other Commands (No.):
       High Rate Telemetry
          Analog Points (No.):
        Digital Points (No.):
          Sample Rate (sec<sup>-1</sup>):
          Word Length (bits):
       Low Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
          Sample Rate (sec-1):
        Word Length (bits):
Safety
    Failure Model (flag):
                                                    1
    Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                   10
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                    1.0
   Total Redundant Elements (No.):
                                                    1
Cost
   Design Engineering ($1000):
                                                    0.
   Test and Evaluation ($1000):
   Unit Production ($1000):
                                                            CER
   Reference Quantity (No.):
   Factor (N.D.):
Schedule
  Development Lead Time Constant (months):
  Development Lead Time Variable (months):
  Qualification Lead Time Constant (months):
                                                   0 _
  Qualification Lead Time Variable (months):
                                                   0
  State-of-Art Factor (N.D.):
                                                   I. 0
```

APS (0302) Subsystem:

Cold Gas Configurations:

Filter (Vacco FID10178) Equipment Type:

#### Performance

Technical Characteristics

- Maximum pressure:
- 2.758 x  $10^7$  N/m<sup>2</sup> (4000 psia) 3.4 x  $10^8$  N/(kg-m)<sup>2</sup> (1.0 x  $10^4$  psi sec<sup>2</sup>/lb<sup>2</sup>) Flow resistance: (2)
- (3)
- (4)
- (5)
- (6)
- (7)
- (8)
- (9)
- (10)

#### Power

NA Average Power (watts):

NAMaximum Power (watts):

NA Minimum Power (watts): NA

Nominal Voltage (volts): ΝA Maximum Voltage (volts):.

NAMinimum Voltage (volts):

Converter/Inverter

Requirement (flag):

0.43 (0.95 lb) Weight (kg):

 $2.8 \times 10^3$  (0.1 ft<sup>3</sup>) Volume (cc):

Vibration

21.0 Random (g, rms):

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 366 (200°F)

Minimum (<sup>o</sup>K): 219 (-65° F)

```
Performance (continued)
   CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
      Other Commands (No.):
      High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec 1):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
Safety
   Failure Model (flag):
                                                    1
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr);
                                                   10
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                    1.0
                                                    1
   Total Redundant Elements (No.):
Cost
   Design Engineering ($1000):
                                                    0
   Test and Evaluation ($1000):
   Unit Production ($1000): -
                                                            CER
   Reference Quantity (No.):
   Factor (N.D.):
Schedule
  Development Lead Time Constant (months):
                                                    0
  Development Lead Time Variable (months):
                                                    0
  Qualification Lead Time Constant (months):
                                                    0
  Qualification Lead Time Variable (months):
                                                    0 ,
  State-of-Art Factor (N.D.):
                                                  , 1, 0
```

APS (0401) Subsystem:

Configurations: Cold Gas

Pressure Regulator (Sterer 51320) Equipment Type:

#### Performance

#### Technical Characteristics

 $3.448 \times 10^7 \text{ N/m}^2$  (5000 psi: Maximum pressure:

 $0.0090 \text{ cm}^2 (0.0014 \text{ in}^2)$ Flow area: (2)

1.  $0 \times 10^5 \text{ N/m}^2$  (15 psia) 6.  $90 \times 10^5 \text{ N/m}^2$  (100 psia) Minimum set point: (3)

Maximum set point: (4)

(5)

(6)

(7)

(8)-

(9)

(10)

#### Power

Average Power (watts): NA

Maximum Power (watts): NA

Minimum Power (watts): NA

Nominal Voltage (volts): NA

Maximum Voltage (volts): NΑ

Minimum Voltage (volts): NA

Converter/Inverter

Requirement (flag):

0.522 (1.15 lb) Weight (kg):

 $2.8 \times 10^3 \quad (0.1 \text{ ft}^3)$ Volume (cc):

Vibration

Random (g, rms): 7.3

Non-Random (g):

#### Temperature

Maximum (<sup>O</sup>K): 344 (160°F)

233 (-40° F) Minimum (<sup>o</sup>K):

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 1 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) 00C Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 `2 Total Redundant Elements (No.): Cost 178.0 Design Engineering (\$1000): 48.0 Test and Evaluation (\$1000): 22, 5 Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule 2.8 Development Lead Time Constant (months): Development Lead Time Variable (months): 1.0 Qualification Lead Time Constant (months): 1.3 Qualification Lead Time Variable (months): 0..1 State-of-Art Factor (N.D.): 1:0

Subsystem: APS (0402)

Configurations: Cold Gas

Equipment Type: Pressure Regulator (Fairchild 617000)

#### Performance

#### Technical Characteristics

(1) Maximum pressure:  $2.690 \times 10^7 \text{ N/m}^2$  (3900 psia)

(2) Flow area:  $0.006 \text{ cm}^2 (0.001 \text{ in}^2)$ 

(3) Minimum set point:  $2.4 \times 10^{5} \text{ N/m}^2$  (35 psia)

(4) Maximum set point:  $2.8 \times 10^5 \text{ N/m}^2$  (41 psia)

(5)

(6)

(7)

(8)

(9)

(10)

#### Power

Average Power (watts): NA

Maximum Power (watts): NA

Minimum Power (watts): NA

Nominal Voltage (volts): NA

Maximum Voltage (volts): NA

Minimum Voltage (volts): NA

Converter/Inverter Requirement (flag):

Weight (kg): 0.54 (1.2 lb)

Volume (cc):  $2.8 \times 10^3$  (0.1 ft<sup>3</sup>)

Vibration

Random (g, rms): 12.7

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 339 (150<sup>o</sup> F)

Minimum (<sup>o</sup>K): 239 (-30<sup>o</sup> F)

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 1 Digital Points (No.): Sample Rate (sec -1): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 5000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): : Total Redundant Elements (No.): Cost 181.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 50.0 Unit Production (\$1000): 23.0 1 Reference Quantity (No.): ŀ Factor (N.D.): Schedule 2.8 Development Lead Time Constant (months): 1.0 Development Lead Time Variable (months): 1.3 Qualification Lead Time Constant (months): 0.1 Qualification Lead Time Variable (months): State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0403) Configurations: Cold Gas Equipment Type: Pressure Regulator (Sterer 51310) Performance Technical Characteristics  $3.172 \times 10^7 \text{ N/m}^2$  (4600 psia) (1)Maximum pressure:  $0.13 \text{ cm}^2 (0.02 \text{ in}^2)$ (2) Flow area:  $1.38 \times 10^6 \, \text{N/m}^2$  (200 psia) (3) Minimum set point:  $1.72 \times 10^6 \text{ N/m}^2$  (250 psia) Maximum set point: (4)(5) (6)(7)(8)- (9) (10)Power Average Power (watts): NA NA Maximum Power (watts): Minimum Power (watts): NANominal Voltage (volts): NA Maximum Voltage (volts): NAMinimum Voltage (volts): NA Converter/Inverter-Requirement (flag): 1.9 (4.1 lb) Weight (kg):  $1.1 \times 10^4 \ (0.4 \text{ ft}^3)$ Volume (cc): Vibration / Random (g, rms): 7.3 Non-Random (g): Temperature 344.(160°F) Maximum (<sup>0</sup>K): 233  $(-40^{\circ} \text{ F})$ Minimum (<sup>o</sup>K):

```
Performance (continued)
   CDPI
      Power Switching Commands (No.):
      Time Tagged Commands (No.):
      Other Commands (No.):
     High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
        Sample Rate (sec 1):
        Word Length (bits):
      Low Rate Telemetry
                                                  1
        Analog Points (No.):
        Digital Points (No.):
        Sample Rate (sec<sup>-1</sup>):
                                                  1
        Word Length (bits)::
                                                  8
Safety
Failure Model (flag):
                                                  1
   Failure Parameters
     Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                              5000
     Standard Deviation (x 10<sup>+9</sup> hr):
                                                1.0
      Dormancy . Factor (N. D.):
   Total Redundant Elements (No.):
Cost
                                                460.0
   Design Engineering ($1000):
                                                125.0
   Test and Evaluation ($1000):
                                                47.0
   Unit Production ($1000):
   Reference Quantity (No.):
                                                  1
   Factor (N.D.):
Schedule
                                                  2.8
   Development Lead Time Constant (months):
   Development Lead Time Variable (months):
                                                  1.5
   Qualification Lead Time Constant (months):
                                                  1.3
   Qualification Lead Time Variable (months):
                                                  0.2
  State-of-Art Factor (N.D.):
                                         1.0
```

Subsystem: APS (0501) Configurations: Cold Gas Equipment Type: Tank (PSI 80082) Performance Technical Characteristics  $6.55 \times 10^3 \text{ cm}^3 (400 \text{ in}^3)$ (1)Volume:  $2.496 \times 10^7 \,\mathrm{N/m}^2$  (3620 psia) (2) Maximum pressure: (3)(4)(5) (6)(7)(8) (9) (10)Power Average Power (watts): NA Maximum Power (watts): NA Minimum Power (watts): NANominal Voltage (volts): NAMaximum Voltage (volts): NA Minimum Voltage (volts): NΑ Converter/Inverter Requirement (flag): '2.:8 (6. 1 lb)· · · . Weight (kg):  $6.5 \times 10^3$  (0.23 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms). Non-Random (g): Tempe rature

Pressure (kg/m<sup>2</sup>):

Maximum (<sup>O</sup>K):

Minimum (<sup>o</sup>K):

344 (160°F)

219 (-65°F)

# Performance (continued) CDPI Power Switching Commands' (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): Standard Deviation (x 10 +9 hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule 3 63 Development Lead Time Constant (months): Development Lead Time Variable (months): Ö Qualification Lead Time Constant (months): - 0. Qualification Lead Time Variable (months): 0': State-of-Art Factor (N.D.):

1.0

Subsystem: APS (0502) Configurations: Cold Gas Equipment Type: Tank (Fansteel 9490304) Performance Technical Characteristics 1.  $57 \times 10^4 \text{ cm}^3$  (960 in<sup>3</sup>) 2.  $240 \times 10^7 \text{ N/m}^2$  (3250 psia) (1)Volume: . (2)Maximum pressure: (3) (4)(5) (6) (7)(8)(9) (10)Power Average Power (watts): NA Maximum Power (watts): NA Minimum Power (watts): NΑ Nominal Voltage (volts): NA Maximum Voltage (volts): NA · Minimum Voltage (volts): ΝA Converter/Inverter Requirement (flag): ·Weight (kg): 5.4 (12.0 lb)  $1.6 \times 10^4 \quad (0.56 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature

Maximum (°K): 344 (160° F) Minimum (°K): 219 (-65° F)

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.) Other Commands (No.): High Rate Telemetry Analog Points (No.): :Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): . Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 360 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): 4 \_'otal Redundant Elements (No.): Cost 0.1 Design Engineering (\$1000): 0 Test and Evaluation (\$1000): CER Unit Production (\$1000): 0 1 Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): State-of-Art Factor (N.D.):

Subsystem: APS (0503) Configurations: Cold Gas Equipment Type: Tank (Fansteel) Performance Technical Characteristics 2.  $130 \times 10^4 \text{ cm}^3 \text{ (1300 in}^3\text{)}$ 3.  $568 \times 10^7 \text{ N/m}^2 \text{ (5175 psia)}$ (1) Volume: Maximum pressure: (3)(4)(5) (6)(7) (8) (9) (10)Power Average Power (watts): NA Maximum Power (watts): NA Minimum Power (watts): NA Nominal Voltage (volts): NA Maximum Voltage (volts): NA Minimum Voltage (volts): NΑ Converter/Inverter Requirement (flag): Weight (kg): 12.6 (27.8 lb)  $2.1 \times 10^4$ .  $(0.75 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 344 (160° F) 219 (-65° F) Minimum (OK):

# Performance (continued) **CDPI** Power Switching Commands. (No.):... Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry . . Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): 1 . Word Length (bits): 8 Safety 1. Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): -60 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months): 0 · Qualification Lead Time Variable (months): . . . 0 State-of-Art Factor (N.D.):

Subsystem: APS (0504) Configurations: Cold Gas Equipment Type: Tank (Arde E3749) Performance-Technical Characteristics 3.  $212 \times 10^4$  cm.  $^3$  (1960 in<sup>3</sup>) 2:  $240 \times 10^7$  N/m<sup>2</sup> (3250 psia) (1) Volume: (2) Maximum pressure: (3) (4)(5) (6) (7) (8) (9) (10)Power ΝA Average Power (watts): NA Maximum Power (watts): Minimum Power (watts): NA Nominal Voltage (volts): NA Maximum Voltage (volts): NA Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): 10.0 (22.0 lb). Weight (kg):  $3.2 \times 10^4$  (1. 13 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): 8.3 Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 344 (160<sup>o</sup> F) Minimum (<sup>o</sup>K): 219 (-65<sup>o</sup> F)

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr., 360 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): 'Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months): 0 Qualification Lead Timé. Variable (months): 0 1

State-of-Art Factor (N.D.):

1.0

Subsystem: APS (0506) Configurations: Cold Gas Equipment Type: Tank (Airite 6396) Performance Technical Characteristics  $4.441 \times 10^4 \text{ cm}^3 (2710 \text{ in}^3)$ (1)Volume:  $2.240 \times 10^7 \text{ N/m}^2 (3250 \text{ psia})$ (2) Maximum pressure: (3) (4)(5) (6) (7) (8) (9) (10)Power Average Power (watts): NA Maximum Power (watts): NA Minimum Power (watts): NA Nominal Voltage (volts): NA

Maximum Voltage (volts): NANA Minimum Voltage (volts):

Converter/Inverter Requirement (flag):

Weight (kg): 13.6 (30.0 lb)

 $4.4 \times 10^4 (1.57 \text{ ft}^3)$ Volume (cc):

Vibration

Random (g, rms):

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 344 (160°F) Minimum (<sup>o</sup>K): 219 (-65°F)

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 360 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): 4. Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): 0 CER Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): , Q. Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): 0 . . Qualification Lead Time Variable (months): 0 State-of-Art Factor (N.D.): 1.0

```
Subsystem:
Configurations:
                     Cold Gas
Equipment Type:
                     Tank (Airite 6485-3)
Performance
   Technical Characteristics
                                       5.709 \times 10^{4}_{-} \text{ cm}^{3} (3484 \text{ in}^{3})
      (1)
             Volume:
                                       3.310 \times 10^7 \text{ N/m}^2 (4800 psia)
      (2)
             Maximum pressure:
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                       NA
      Maximum Power (watts):
                                       NA
      Minimum Power (watts):
                                       NA
      Nominal Voltage (volts):
                                       NI
      Maximum Voltage (volts):
                                       NA
      Minimum Voltage (volts):
                                       NA
      Converter/Inverter
        Requirement (flag):
                                        22.7 (50.0 lb)
   Weight (kg):
                                       2.72 \times 10^4 \ (2.02 \text{ ft}^3)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
                                        366 (200° F)
      Maximum (OK):
                                        200 (-100° F)
      Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

APS (0507).

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): . . Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): 1 Word Length (bits): ٠8 Safety Failure Model (flag): 1 -Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 360 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): 0 Development Lead Time Variable (months): Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): State-of-Art Factor (N.D.):

APS (0508) Subsystem: Configurations: Cold Gas Equipment Type: Tank (Airite 6529-1) Performance Technical Characteristics 9.  $504 \times 10^4 \text{ cm}^3 (5800 \text{ in}^3)$ 2.  $413 \times 10^7 \text{ N/m}^2 (3500 \text{ psia})$  $(1)^{\hat{}}$ Volume: Maximum pressure: · (2) (3) (4)(5) (6) (7) (8) (9) (10)Power Average Power (watts): NA Maximum Power (watts): NA Minimum Power (watts): NA Nominal Voltage (volts): NA Maximum Voltage (volts): NA Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): 25.1 (55.5 lb) Weight (kg):  $9.51 \times 10^4$  (3.36 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): 13.1 Non-Random (g): Temperature

Maximum (<sup>0</sup>K):

Minimum (<sup>o</sup>K):

394 (160° F) · 219 (-65° F)

## Performance (continued) **CDPI** Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety 1 . . Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 360 Standard Deviation (x 10<sup>+9</sup> hr): 1:0 Dormancy Factor (N.D.): Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): 0) Test and Evaluation (\$1000): Unit Production (\$1000): CER. Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months): ٠0. Qualification Lead Time Variable (months): , O . State-of-Art Factor (N.D.): 1.0

APS (0509) Subsystem: Cold Gas Configurations: Equipment Type: Tank (Fansteel 4425003) Performance Technical Characteristics 1.  $274 \times 10^5 \text{ cm}^3 (7775 \text{ in}^3)$ 2.  $206 \times 10^7 \text{ N/m}^2 (3200 \text{ psia})$ Volume:  $(1)^{r}$ . Maximum pressure: (2)(3)(4)(5) (6)(7)(8) (9) (10)Power NA Average Power (watts): Maximum Power (watts): NA Minimum Power (watts): NA Nominal Voltage (volts): NΑ Maximum Voltage (volts): NΑ Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): 49.9 (110.0 lb) Weight (kg):  $1.27 \times 10^5 (4.50 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g):

Temperature

Maximum (°K): 344 (160° F) Minimum (°K): 219 (-65° F)

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry - Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters · Failure Rate or Mean (x 10<sup>±9</sup> hr): 360 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): -0 CER Reference Quantity (No.): Factor (N.D.): Schedule 0 Development Lead Time Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0 State-of-Art Factor (N.D.): 1.0

```
Configurations:
                    Cold Gas
Equipment Type:
                    Fill and Drain Valve (Sterer 34650-1)
Performance
   Technical Characteristics
            Maximum pressure: 3.172 \times 10^7 \text{ N/m}^2 (4600 psia)
      (1)
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                     NΑ
                                     NΑ
     Maximum Power (watts):
      Minimum Power (watts):
                                     NA
     Nominal Voltage (volts):
                                     NA
     Maximum Voltage (volts):
                                     NA
     Minimum Voltage (volts):
                                     NA
      Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                     0.073 (0.16 чь)
   Volume (cc):
                                     560 (0.02 ft<sup>3</sup>)
   Vibration
     Random (g, rms):
                                     7.3
     Non-Random (g):
  Temperature
     Maximum (<sup>o</sup>K):
                                     344 (160° F) -
     Minimum (<sup>o</sup>K):
                                     233 (-40° F)
  Pressure (kg/m<sup>2</sup>):
```

Subsystem:

APS (0601)

### Performance (continued) CDPI Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec\_1): Word Length (bits): Safety . Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±0</sup> 70 Standard Deviation (x 10<sup>+9</sup> hr). Dormancy Factor (N.D.): 1, 0 1 Total Redundant Elements (No.) Cost · 0 Design Engineering (\$1000): Test and Evaluation (\$1000): 0 Unit Production (\$1000): 0 . 1 Reference Quantity (No.): 1. · Factor (N.D.): Schedule 0 . Development Lead Time Constant (months): Development Lead Time Variable (months): 0 % Qualification Lead Time Constant (months): 0. . Qualification Lead Time Variable (months): 0 , State-of-Art Factor (N.D.): 1.0

```
Configurations:
                        Cold Gas
Equipment Type:
                        Relief Valve (Pyronetics)
Performance
   Technical Characteristics
                                                     1.86 \times 10^6 \, \text{N/m}^2 (270 psia)
      (1)
                Minimum set point:
               Maximum set point: 2.07 \times 10^6 \text{ N/m}^2 \text{ (300 psia)}. Maximum operating pressure: 2.413 \times 10^7 \text{ N/m}^2 \text{ (3500 psia)}
       (2)
       (3)
       (4)
       (5)
       (6)
       (7) :
       (8)
       (9)
      (10)
   Power
       Average Power (watts):
                                                     NA
       Maximum Power (watts):
                                                     NA
       Minimum Power (watts):
                                                     NA
       Nominal Voltage (volts):
                                                     NA
       Maximum Voltage (volts):
                                                     NA
       Minimum Voltage (volts):
                                                     NA
       Converter/Inverter
          Requirement (flag):
   Weight (kg):
                                                    £ 0.09 \( (0.2 1b)
                                                     560 (0.02 ft<sup>3</sup>)
   Volume (cc):
   Vibration
       Random (g, rms):
       Non-Random (g):
   Temperature
       Maximum (<sup>O</sup>K):
                                                     333 (140°F)
                                                     233 (-40^{\circ} F)
       Minimum (<sup>o</sup>K):
   Pressure (kg/m<sup>2</sup>):
```

Subsystem:

APS (0701)

## Performance (continued) CDPI Power Switching Commands (No.): · Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): 'Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): . . . Failure Parameters Failure Rate or Mean (x 10<sup>±7</sup> hr): 70 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): $\cdot 1.0$ Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): 1 Factor (N.D.): 1. Schedule Development Lead Time Constant (months): 0. Development Lead Time Variable (months): 0: Qualification Lead Time Constant (months): 0. Qualification Lead Time Variable (months): 0. State-of-Art Factor (N.D.): 1.1.0

APS (0801) Subsystem: Configurations: Monopropellant Equipment Type: Thruster (Rocket Research MR-74) Performance Technical Characteristics 0.44 N (0.11b) (1)Thrust level: 100,000 cycles (2) Pulse life:  $2.07 \times 10^6 \text{ N/m}^2 \text{ (300 psia)}$ (3) Inlet pressure:  $8.0 \times 10^4$  N-sec (18,000 lb-sec Total impulse:\* (4)(5) ISP:\* 220 sec (6)Mixture ratio (N.D.): \*\* (7)(8)(9)(10)Power 1.0 Average Power (watts): 2, 6 Maximum Power (watts): 0 Minimum Power (watts): Nominal Voltage (volts): 28.0 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): .0. 29 (0. 65 lb) Weight (kg):  $2.0 \times 10^3 \ (0.07 \text{ ft}^3)$ Volume (cc): Vibration 17.0 Random (g, rms): Non-Random (g): Temperature

Maximum (°K): 355 (180°F)
Minimum (°K): 278 (40°F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Z Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 . 8 Word Length (bits): Safety - 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700. Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): - 0.1 12 Total Redundant Elements (No.): • • • Cost 109.0 Design Engineering (\$1000): 27.0 Test and Evaluation (\$1000): 8.2 Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule 3.0 Development Lead Time Constant (months): Development Lead Time Variable (months): 0.8 Qualification. Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 0.1

1.0

State-of-Art Factor (N.D.):

Subsystem:		APS	(0802)			
Configurations:		Monopropellant				
Equipment Type:		Thruster (Hamilton Standard REA-10-13) .				
Performance	е					
Technical	l Charac	teris	tics			
(1)	Thrust level:				0.44 N (0.1 lb)	
(2)	Pulse life:				375,000 cycles ·	
(3)	Inlet pressure:				$1.72 \times 10^6 \text{ N/m}^2$	
(4)	Total impulse:*				$7.43 \times 10^4 \text{ N-sec}$	(16,700 lb-sec)
(5)	ISP:*				225 sec	
(6)	(6) Mixture ratio (N.D.).**					
(7)						
(8)						
(9)						
(10)						
Power					•	
Average Power (watts):				1.0		
Maximum Power (watts):				6.0		
Minimum Power (watts):				0		
Nominal Voltage (volts):					28.0	
Maximum Voltage (volts):				32.0		
Minimum Voltage (volts):					24.0	
	rter/Inv 11 remen		;):			
Weight (kg):				0.14 (0.3 lb)		
Volume (cc):				850 (0.03 ft <sup>3</sup> )		
Vibration						
Random (g, rms):			-	21.0		
Non-Random (g):						
Temperat	ure			•		
Maximum ( <sup>o</sup> K):					333 (140°F)	
Minimum ( <sup>o</sup> K):					266 ( 20° F)	
Pressure	(kg/m <sup>2</sup>	<b>)</b> :				

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): Standard Deviation (x 10<sup>+9</sup> hr): · · Dormancy Factor (N.D.): 0.1 Total Redundant Elements (No.): Cost 61.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 15.0 · Unit Production (\$1000): 4.4 Reference Quantity (No.): 3 Factor (N.D.): 1 . Schedule Development Lead Time Constant (months): 3, 0 Development Lead Time Variable (months): 0.8 Qualification Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0803) Configurations: 1 Monopropellant Equipment Type: Thruster (Rocket Research MR-6C) Performance Technical Characteristics Thrust level: 2.2 N (0.5 lb) (1)100,000 cycles (2) Pulse life:  $1.93 \times 10^6 \text{ N/m}^2$  (280 psia) (3) Inlet pressure:  $6.7 \times 10^4$  N-sec (15,000 lb-sec) Total impulse\*: (4)ISP\*: 224 sec (5) Mixture ratio (N.D.)\*\*: (6) (7)(8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 4.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 0:29 (0.65 lb) Weight (kg):  $2.0 \times 10^3 \ (0.07 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): 21.0 Non-Random (g): Temperature

Maximum (°K): 328 (130° F) Minimum (°K): 244 (-20° F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters
\*\*Applicable to bipropellant thrusters only

### Performance (continued) CDÝI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety . 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>-</sup>' hr):. 1700 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.1 Total Redundant Elements (No.): 12. Cost 109.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 27.0 Unit Production (\$1000): 8.2 Reference Quantity (No.): 3 Factor (N.D.): ŀ Schedule Development Lead Time Constant (months): 3.0 0.8 Development Lead Time Variable (months): -Qualification Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0804) Monopropellant Configurations: Thruster (Hamilton Standard REA-17-7) Equipment Type: Performance Technical Characteristics Thrust level: 2,2 N (0.5 lb) (1) $1.5 \times 10^6$  cycles. Pulse life: (2) $1.72 \times 10^6 \text{ N/m}^2$  (250 psia) Inlet pressure: (3)  $8.0 \times 10^4$  N-sec (18,000 lb-sec) Total impulse\*: (4)ISP\*: 227 sec (5) Mixture ratio (N.D.) \*\*: (6)(7) (8)(9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 8.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28,0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 0,2 (0,4 lb)  $1.1 \times 10^3 (0.04 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 333 (140° F) Maximum (°K):

266 ( 20° F) Minimum (<sup>o</sup>K):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry . ·-2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety · 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.1 12 Total Redundant Elements (No.): Cost 76.0 Design Engineering (\$1000): 76.0 Test and Evaluation (\$1000): Unit Production (\$1000): 5.6 Reference Quantity (No.): 3 1 Factor (N.D.): Schedule 3.0 Development Lead Time Constant (months): 0.8 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

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Subsystem:
                      APS (0805)
Configurations:
                      Monopropellant
Equipment Type:
                      Thruster (Hughes HS-333)
Performance
   Technical Characteristics
     (1)
           Thrust level:
                                      4.4 N (1.0 lb)
     (2)
           Pulse life:
                                      20,000 cycles
     (3)
           Inlet pressure (psia):
     (4)
           Total impulse (lb-sec)*:
           ISP (sec)*:
     (5)
     (6)
           Mixture ratio (N.D.)**:
     (7)
     (8)
    (9)
    (10)
  Power
     Average Power (watts):
     Maximum Power (watts):
     Minimum Power (watts):
     Nominal Voltage (volts):
     Maximum Voltage (volts):
     Minimum Voltage (volts):
     Converter/Inverter
       Requirement (flag):
  Weight (kg):
  Volume (cc):
  Vibration
     Random (g, rms)
     Non-Random (g):
  Temperature
     Maximum (°K):
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
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<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) **CDPI** Power Switching Commands (No. Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry ' <sup>2</sup> Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 Total Redundant Elements (No.): Cost 115.0 Design Engineering (\$1000): 115.0 Test and Evaluation (\$1000): Unit Production (\$1000): 8.7 3 Reference Quantity (No.): 1 Factor (N.D.): Schedule 3.0 Development Lead Time Constant (months): Development Lead Time Variable (months): 0.8 Qualification Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

APS (0806) Subsystem: Configurations: Monopropellant Equipment Type: Thruster (TRW MRE-1) Performance Technical Characteristics (1)Thrust level: 4.4 N (1.0 lb) Pulse life: 100,000 cycles (2) $2.59 \times 10^6 \text{ N/m}^2 (375 \text{ psia})$  ... · (3) Inlet pressure:  $4.4 \times 10^4$  N-sec (9,800 lb-sec) (4)Total impulse\*: ISP\* 220 sec (5) Mixture ratio (N.D.)\*\*: (6) (7)(8)(9)(10)Power Average Power (watts): 1.0 Maximum Power (watts): 5.4 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 31.0 Minimum Voltage (volts): 26.0 Converter/Inverter Requirement (flag): Weight (kg): 0.3 (0.71b) $2.0 \times 10^3 \ (0.07 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): 21.0 Non-Random (g): Temperature 322 (120° F) Maximum (<sup>O</sup>K): Minimum (<sup>o</sup>K): 278 ( 40° F)

Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters
\*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Safety · Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.1 Total Redundant Elements (No.): 12 Cost 115.0 Design Engineering (\$1000): 115.0 Test and Evaluation (\$1000): 8.7 Unit Production (\$1000): 3 Reference Quantity (No.): 1 Factor (N.D.): Schedule 3.0 Development Lead Time Constant (months): 0.9 Development Lead Time Variable (months): 1,5 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0,1

State-of-Art Factor (N.D.):

1.0

APS (0807) Subsystem: Configurations: Monopropellant Equipment Type: Thruster (TRW MRE-3) Performance Technical Characteristics Thrust level: 16 N (3.7 lb) (1)60,000 cycles (2) Pulse life:  $4.14 \times 10^6 \text{ N/m}^2$  (600 psia) (3) Inlet pressure: (4)Total impulse (lb-sec)\*: (5) ISP (sec)\*: Mixture ratio (N.D.)\*\*: (6) (7)(8) (9) (10)Power 1.0 Average Power (watts): 5.4 Maximum Power (watts): Minimum Power (watts): 0.0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 31.0 26.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 0.3 (0.6 lb) Weight (kg):  $1.7 \times 10^3$  (0.06 ft<sup>3</sup>) Volume (cc): Vibration 19.5 Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 322 (120° F) Minimum (<sup>0</sup>K): 278 ( 40° F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): 1 Word Length (bits): 8 Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 Total Redundant Elements (No.): Cost 101.0 Design Engineering (\$1000): 101.0 Test and Evaluation (\$1000): 7.7 Unit Production (\$1000): 3 Reference Quantity (No.): 1 Factor (N.D.): ٠ .: -Schedule 3.0 Development Lead Time Constant (months): Development Lead Time Variable (months): 0.8 Qualification Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0808) . Monopropellant Configurations: Thruster (TRW 404020) Equipment Type: Performance: Technical Characte Thrust level: 18 N (4.1 lb) (1)(2) Pulse life: 93,000 cycles  $4.14 \times 10^6 \text{ N/m}^2$  (600 psia) Inlet préssure: . ` (3)  $6.49 \times 10^4$  N-sec (14,600 lb-sec) (4)Total impulse\*: -230 sec (5) ISP\*: Mixture ratio (N.D.)\*\*: (6) (7)(8)(9) (10)ower 1.0 Average Power (watts): 5.53 Maximum Power (watts): Minimum Power (watts): 0 Nominal Voltage (volts): - 28.0 32.6 Maximum Voltage (volts): 26.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): Weight (kg): 0.3 (0.6 1b) $1.7 \times 10^3$  (0,06 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): 19.5 Non-Random (g): Temperature 322 (120° F) Maximum (<sup>O</sup>K): 278 ( 40° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry 2 Analog Points, (No.): . Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): Total Redundant Elements (No.): 12 Cost Design Engineering (\$1000): 101.0 101.0 Test and Evaluation (\$1000): Unit Production (\$1000): 7.7 3 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 3.0 1.0 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 0.1

State-of-Art Factor (N.D.):

1.0

Subsystem: APS (0809) Configurations: Monopropellant Thruster (Hamilton Standard REA-16-10) Equipment Type: Performance Technical Characteristics Thrust level: 22 N (5.0 lb) (1)(2) Pulse life: 100,000 cycles  $2.07 \times 10^6 \text{ N/m}^2$  (300 psia) (3) Inlet pressure:  $1.49 \times 10^5$  N-sec (33,500 lb-sec) Total impulse\*: (4)235 sec ISP\*: (5) Mixture ratio (N.D.)\*\*: (6) **(7)** (8)(9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 17.8 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): . 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 0.4 (0.9 lb  $2..5 \times 10^3 \ (0.09 \text{ ft}^3)$ Volume (cc): Vibration 19.6 Random (g, rms): Non-Random (g): Temperature 333 (140° F) Maximum (<sup>o</sup>K): Minimum (<sup>o</sup>K): 278 (40° F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety Failure Model (flag): · Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr). 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 Total Redundant Elements (No.): Cost 139.0 Design Engineering (\$1000): 139.0 Test and Evaluation (\$1000): Unit Production (\$1000): 10.6 3 Reference Quantity (No.): , 1 Factor (N.D.): Schedule 3.0 Development Lead Time Constant (months): Development Lead Time Variable (months): 1.2 1.5 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): (0.1)

State-of-Art Factor (N.D.):

Subsystem: APS (0810) Configurations: Monopropellant Equipment Type: Thruster (Rocket Research MR-50A) Performance Technical Characteristics Thrust level: (1)22 N (5.0 lb) (2)Pulse life: 175,000 cycles  $1.59 \times 10^6 \text{ N/m}^2$  (230 psia) (3) Inlet pressure:  $2.02 \times 10^5 \text{ N-sec}$  (45,500 lb-sec) (4)Total impulse\*: ISP\*: 227 sec (5) (6) Mixture ratio (N.D.)\*\*: (7)(8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 21.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 0.54 (1.2 lb) Weight (kg):  $2.8 \times 10^3$  (0.1 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): 38.0 Non-Random (g): Temperature Maximum (<sup>o</sup>K): 333 (140° F)

# Pressure (kg/m<sup>2</sup>):

Minimum (<sup>o</sup>K):

 $278 (40^{\circ} F)$ 

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters:
\*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Point's (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): . Safety . Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0,1 Dormancy Factor (N.D.): 12 Total Redundant Elements (No 1. Cost 171.0 Design Engineering (\$1000): 171.0 Test and Evaluation (\$1000): 13:2 Unit Production (\$1000): .3 Reference Quantity (No.): Factor (N.D. .. 1 Schedule 3.0 Development Lead Time Constant (months): Development Lead Time Variable (months): 1.0 Qualification Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

APS (0811) Subsystem: Configurations: Monopropellant Equipment Type: Thruster (Rocket Research MR-3A) Performance Technical Characteristics Thrust level: 110 N (25.0 lb) (1)Pulse life: 25,000 cycles (2)  $2.48 \times 10^6 \text{ N/m}^2$  (360 psia) Inlet pressure: (3)  $6.27 \times 10^5$  N-sec (141,000 lb-sec) (4)Total impulse\*: ISP\*: 228 sec (5) Mixture ratio (N.D.)\*\*: (6) (7)(8)(9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 26.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 2.10 (4.64 lb) Weight (kg):  $1.3 \times 10^4 \ (0.46 \text{ ft}^3)$ Volume (cc): Vibration 36.0 Random (g, rms): Non-Random (g): Tempe rature Maximum (<sup>o</sup>K): 394 (250°F) Minimum (<sup>o</sup>K): 278 ( 40° F) Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

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Performance (continued)
   CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
      Other Commands (No.):
      High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec^{-1}):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
                                                   2
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                   1
                                                   8
         Word Length (bits):
Safety
                                                   5
   Failure Model (flag):
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                1700
      Standard Deviation (x 10<sup>+9</sup> hr):
                                                   0.1
      Dormancy Factor (N.D.):
   Total Redundant Elements (No.):
                                                   6
Cost
                                                 480.0
   Design Engineering ($1000):
   Test and Evaluation ($1000):
                                                 480.0
   Unit Production ($1000):
                                                  39.0
   Reference Quantity (No.):
                                                   3
                                                   1
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months):
                                                   3.0
   Development Lead Time Variable (months):
                                                   1.5
   Qualification Lead Time Constant (months):
                                                   1.5
  Qualification Lead Time Variable (months):
                                                   0.2
  State-of-Art Factor (N.D.):
                                                   1.0
```

Subsystem: APS (0812) Configurations: Monopropellant Equipment Type: Thruster (Marquardt R-24-C) Performance Technical Characteristics . 110 N (25.0 lb) Thrust level: (1)Pulse life: 200,000 cycles (2)  $2.28 \times 10^6 \text{ N/m}^2$  (330 psia) Inlet pressure: (3)  $2.22 \times 10^5$  N-sec (50,000 lb-sec) Total impulse\*: (4)ISP\*: 231 sec (5) Mixture ratio (N.D.)\*\*: (6) (7)(8)(9)(10)Power 1.0 Average Power (watts): 56.0 Maximum Power (watts): 0 Minimum Power (watts): Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 1.1 (2.5 lb) Weight (kg):  $7.1 \times 10^3$  (0.25 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 322 (120° F) 278 ( 40° F) Minimum (<sup>O</sup>K): Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters
\*\*Applicable to bipropellant thrusters only

#### Performance (continued) · CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): ... Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) 1700 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0, 1 Total Redundant Elements (No.): 6 Cost 300.0 Design Engineering (\$1000): 300.0 Test and Evaluation (\$1000): 23.8 Unit Production (\$1000): 3 Reference Quantity (No.): 1 . Factor (N.D.): Schedule 3.0 Development L Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months): . 1.5 Qualification Lead Time Variable (months): ∴0.2

State-of-Art Factor (N.D.):

Subsystem:	APS (0813)		
Configurations:	Monopropellant		
Equipment Type:	Thruster (Rock	hruster (Rocket Research MR-3C)	
Performance .			
Technical Characteristics			
(1) Thrust level:		180 N (40.0 lb)	
(2) Pulse life:		25,000 cycles	
(3) Inlet pressure:		$3.55 \times 10^6  \text{N/m}^2  (515  \text{psia})$	
(4) Total imp	oulse*:	6.27 x 10 <sup>5</sup> N-sec (141,000 lb-sec)	
(5) ISP*:		228 sec	
(6) Mixture ratio (N.D.)**:			
(7)			
(8)			
(9)			
(10)			
Power			
Average Power (watts):		1.0	
Maximum Power (watts):		28.0	
Minimum Power (watts):		0	
Nominal Voltage (volts):		28.0	
Maximum Voltage (volts):		32.0	
Minimum Voltage (volts):		24.0	
Converter/Inverter Requirement (flag):			
Weight (kg):		1.26 (2.78 lb)	
Volume (cc):		$7.9 \times 10^3 \ (0.28 \text{ ft}^3)$	
Vibration			
Random (g, rms):		36.0	
Non-Random (g):			
Temperature			
Maximum ( <sup>O</sup> K):		394 (250° F)	
Minimum ( <sup>o</sup> K):		278 ( 40° F)	
Pressure (kg/m <sup>2</sup> ):		•	

Pressure (kg/m<sup>2</sup>):

\*Applicable to monopropellant and bipropellant thrusters
\*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0,1 Dormancy Factor (N.D.): `6 Total Redundant Elements (No.): Cost 322.0 Design Engineering (\$1000): 322.0 Test and Evaluation (\$1000): 25.8 Unit Production (\$1000): Reference Quantity (No.): 3 1 Factor (N.D.): Schedule 3.0 Development Lead Time Constant (months): Development Lead Time Variable (months): 1.7 Qualification Lead Time Constant (months): 1.5 0.3 Qualification Lead Time Variable (months): 1:0 . State-of-Art Factor (N.D.):

APS (0814) Subsystem: Monopropellant Configurations: . Thruster (TRW MRE-50-73) Equipment Type: Performance Technical Characteristics 222 N (50.0 lb) Thrust level: (1)Pulse life: 1500 cycles (2)Inlet pressure (psia): (3)  $2.22 \times 10^4$  N-sec (5000 lb-sec) Total impulse\*: (4)230 sec (5) ISP\*: Mixture ratio (N.D.)\*\*: (6) (7)(8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 20.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28,0 Maximum Voltage (volts): 32.0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 2.3 (5.0 lb) Weight (kg):  $1.4 \times 10^4$  (0.5 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 333 (140° F) Maximum (<sup>o</sup>K):

278 ( 40° F) Minimum (<sup>o</sup>K):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x.10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 6 ` Total Redundant Elements (No.): Cost 02.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 02.0 41.0 Unit Production (\$1000): 3 Reference Quantity (No.): 1 Factor (N.D.): Schedule $\cdot$ 3.0 Development Lead Time Constant (months): 1.9 Development Lead Time Variable (months): 1.5 Qualification Lead Time Constant (months): 0.3 Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

APS (0815) Subsystem: Monopropellant Configurations: Thruster (Marquardt R-30) Equipment Type: • 'erformance Technical Characteristics (1)Thrust level: 689 N (155.0 lb) (2)500 cycles Pulse life:  $3.10 \times 10^6 \text{ N/m}^2$  (450 psia) (3) Inlet pressure:  $2.22 \times 10^5$ . N-sec (50,000 lb-sec) (4)Total impulse\*: (5) ISP\*: 234 sec (6) Mixture ratio (N.D.)\*\*: (7)(8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 29.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32:0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 1.3 (2.9 lb) Weight (kg):  $8.2 \times 10^3 \quad (0.29 \text{ ft}^3)$ Volume (cc): Vibration 15.0 Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 322 (120° F)

Minimum (<sup>o</sup>K): 278 ( 40° F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): ·Sample Rate (sec $^{-1}$ ): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): 1 8 Word Length (bits): Safety 5 \_ Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 6 Total Redundant Elements (No.): Cost 334.0 Design Engineering (\$1000): 334.0 Test and Evaluation (\$1000): 26.8 Unit Production (\$1000): Reference Quantity (No.): 3 1 Factor (N.D.): Schedule 3.0 Development Lead Time Constant (months): 3.0 Development Lead Time Variable (months): ... Qualification Lead Time Constant (months): 1.5 0.6 Qualification Lead Time Variable (months): State-of-Art Factor (N.D.): 1.0

APS (0816) Subsystem: Monopropellant & Configurations: Thruster (Walter Kidde 142692) lquipment Type: l'erformance Technical Characteristics 1330 N (300.0 lb) (1)Thrust level: (2) Pulse life (cycles): Inlet pressure (psia): · (3)  $2.22 \times 10^{\circ}$  N-sec (500,000 lb-sec) Total impulse\*: (4)(5) ISP (sec)\*: Mixture ratio (N.D.)\*\*: (6) (7)(8) (9)(10)Power 1.0 Average Power (watts): 20.0 Maximum Power (watts): 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32.0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 2.3 (5.0 lb) Weight (kg):  $1.4 \times 10^4$  (0.5 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 333 (140° F) Maximum (<sup>o</sup>K): 278 ( 40° F) Minimum (<sup>o</sup>K):

Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry · 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 4 Total Redundant Elements (No.): Cost -502,0 Design Engineering (\$1000): 502.0 Test and Evaluation (\$1000): 41.0 Unit Production (\$1000): 3. Reference Quantity (No.): 1 Factor (N.D.): Schedule 3.0 Development Lead Time Constant (months): 3.7 Development Lead Time Variable (months): 1.5 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0.6 1,0 State-of-Art Factor (N.D.):

Subsystem: APS (0817) Monopropellant Configurations: 2 Thruster (Rocke. .....h MR-80A) Equipment Type: Performance Technical Characteristics 2810 N (632.0 lb) (1)Thrust level: Pulse life: 500 cycles (2)  $3.31 \times 10^6 \text{ N/m}^2$  (480 psia) Inlet pressure: (3)  $2.30 \times 10^5$  N-sec (51,600 lb-sec) Total impulse\*: (4) 227 sec ISP\*: (5) Mixture ratio (N.D.)\*\*: (6) (7)(8) (9) (10)Power Average Power (watts): 1.0 18.5 Maximum Power (watts): Minimum Power (watts): 0 Nominal Voltage (volts): 37.0 Maximum Voltage (volts): Minimum Voltage (volts): Converter/Inverter Requirement (flag): 7.67 (16.9 lb) Weight (kg):  $4.8 \times 10^4 \ (1.7 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): 5.5 Non-Random (g): Temperature 325 (125° F) Maximum (<sup>O</sup>K): 278 (40° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

<sup>\*\*</sup>Applicable to monopropellant and bipropellant thrusters
\*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI... Power Switching Commands (No.): Time Tagged Commands (No 1. Other Commands (No.): High Rate Telemetry Analog Point's (No.): Digital Points (No.): .. Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 5 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): -1700 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0, 1 Total Redundant Elements (No.): ·4. Cost Design Engineering (\$1000): 1250.0 Test and Evaluation (\$1000): 1250.0 Unit Production (\$1000): 105.0 Reference Quantity (No.): 3 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): - 3.0 Development Lead Time Variable (months): 5.1 Qualification Lead Time Constant (months): 1.5 Qualification Lead Time Variable (months): 1.3 State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0901) Monopropellant Configurations: Isolation Valve (latching solenoid) Equipment Type: (Hydraulic Research 258278) Performance Technical Characteristics  $2.41 \times 10^6 \text{ N/m}^2$  (350 psia) Maximum pressure:  $0.01 \, \mathrm{cm}^2 \, (0.0017 \, \mathrm{in.}^2)$ Flow area: (2)(3) (4)(5) (6)(7) (8)(9) (10)Power 0 Average Power (watts): 88.0 Maximum Power (watts): 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 33.0 . 23.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 0.3 (0.7 lb) Weight (kg):  $2.0 \times 10^3$  (0.07 ft<sup>3</sup>) Volume (cc): Vibration 21.5 Random (g, rms): Non-Random (g): Temperature 333 (140° F) Maximum (°K): 278 ( 40° F) Minimum (<sup>o</sup>K):

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry. ... Analog Points (No.): · Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 200 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 Total Redundant Elements (No.): 7 Cost Design Engineering (\$1000): 0. 0 Test and Evaluation (\$1000): Unit Production (\$1000): 0 1 Reference Quantity (No.): 1 Factor (N.D.): Schedule , 0` Development Lead Time Constant (months): Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): 0 Qualification Lead Time Variable (months): 0. . State-of-Art Factor (N.D.): 1.0

Subsystem: APS (0902)

Configurations: Monopropellant

Equipment Type: Isolation Valve (latching solenoid) (Marquardt 22700)

#### Performance ·

Technical Characteristics

(1) Maximum pressure:  $2.48 \times 10^6 \text{ N/m}^2$  (360 psia)

(2) Flow area:  $0.77 \text{ cm}^2 (0.12 \text{ in.}^2)$ 

(3)

(4)

(5)

(6)

(7)

(8)

(9)

(10)

#### Power

Average Power (watts): 0

Maximum Power (watts): 60.0

Minimum Power (watts): 0

Nominal Voltage (volts): 27.0

Maximum Voltage (volts): 30.0

Minimum Voltage (volts): 24.0

Converter/Inverter Requirement (flag):

Weight (kg): 0.59 (1.3 lb)

Volume (cc):  $3.7 \times 10^3$  (0.13 ft<sup>3</sup>)

Vibration

Random (g, rms):

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 322 (120<sup>o</sup> F)

Minimum (°K): 278 (40°F).

```
:rformance (continued)
    DPI
   Power: Switching Commands (No.):
      Time Tagged Commands (No.):
      Other Commands (No.):
      High Rate Telemetry
        Analog Points' (No.):
        Digital Points (No.):
        Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
        Sample Rate (sec 1):
         Word Length (bits):
Safety
                                                   1
   Failure Model (flag):
   Failure Parameters ·
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                 200
     Standard Deviation (x 10<sup>+9</sup> hr).
                                                   1.0
      Dormancy Factor (N.D.):
                                                   7
   Total Redundant Elements (No.)
Cost
                                                 ( 0.
   Design Engineering ($1000):
                                                   0
   Test and Evaluation ($1000):
   Unit Production ($1000):
                                                   0
                                                   .1.
   Reference Quantity (No.):
                                                   1
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months): " . 0
   Development Lead Time Variable (months):
                                                   0,
   Qualification Lead Time Constant (months):
                                                  0.
   Qualification Lead Time Variable (months):
   State-of-Art Factor (N.D.):
```

Subsystem: APS (0903) Monopropellant Configurations: Isolation Valve (pyrotechnic) (Pyronetics 1349) Equipment Type: Performance Technical Characteristics  $2.758 \times 10^7 \, \text{N/m}^2$  (4000 psia) Maximum pressure: (1) $7.7 \, \text{cm}^2 \, (1.2 \, \text{in.}^2)$ (2).Flow area: (3)(4)(5) (6) (7) (8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 140.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 32.0 Maximum Voltage (volts): Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 0.68 (1.5 1b)  $4.2 \times 10^3$  (0.15 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 325 (125°F) Maximum (<sup>o</sup>K): 219 (-65°F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

### Performance (continued) DPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry . Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 100 Standard Deviation (x 10<sup>+9</sup> hr): 1,0 Dormancy Factor (N.D.): . 7 Total Redundant Elements (No.): Cost 0 . Design Engineering (\$1000): Test and Evaluation (\$1000): 0 0 Unit Production (\$1000): 1 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): Development Lead Time Variable (months): . Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): State-of-Art Factor (N.D.): 1.0

Configurations: Monopropellant. Equipment Type: Filter (Wintec 3181406-100). Performance Technical Characteristics  $6.895 \times 10^7 \, \text{N/m}^2 \, (1000 \, \text{psia})$ (1)Maximum pressure  $1.61 \times 10^8 \text{ N/(kg-m)}^2$ Flow resistance: (2) (3) (4)**(5)** (6)(7)(8) (9) (10)Power Average Power (watts): NAMaximum Power (watts): NA. Minimum Power (watts): NANominal Voltage (volts): NAMaximum Voltage (volts): NA Minimum Voltage (volts): NΑ Converter/Inverter Requirement (flag):  $0.2 \cdot (0.5 1b)$ Weight (kg):  $1.4 \times 10^3$  (0.05 ft<sup>3</sup>) Volume (cc): Vibration 21.5 Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): Minimum (<sup>o</sup>K): 278 ( 40° F) Pressure (kg/m<sup>2</sup>):

Subsystem:

# CDPI Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): · Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 10 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0. 7 Total Redundant Elements (No.): Cost Design Engineering (\$1000) Test and Evaluation (\$1000) 0 Unit Production (\$1000): 1 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months):. Development Lead Time Variable (months): Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): State-of-Art Factor (N.D.):

Performance (continued)

```
Configurations:
                   Monopropellant
Equipment Type: Filter (Winter 15267-592)
Performance
   Technical Characteristics
           Maximum pressure: 2.76 \times 10^6 \text{ N/m}^2 (400 psia)
                                   1.19 x 10^7 N/(kg-m)<sup>2</sup> (356 psi sec<sup>2</sup>/1b<sup>2</sup>)
      (2)
           Flow resistance:
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (.9)
     (10)
  Power
      Average Power (watts):
                                    NA
     Maximum Power (watts):
                                   NA
     Minimum Power (watts):
                                    NA
     Nominal Voltage (volts):
                                    NA
     Maximum Voltage (volts): NA
     Minimum Voltage (volts): NA
      Converter/Inverter
        Requirement (flag):
                                    0.2 (0.5 lb)
  Weight (kg):
                                    1.4 \times 10^3 (0.05 ft<sup>3</sup>)
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
     Maximum (<sup>o</sup>K):
                                    333 (140° F)
                                   278 ( 40° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>);
```

Subsystem:

· APS (1002)

## Performance (continued) CDPI Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): : Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety · Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 10 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): . 1.0 Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): 0 . 0 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 0 . Qualification Lead Time Variable (months): 0 ... 1.0 State-of-Art Factor (N.D.):

APS (1101) Subsystem: Configurations: Monopropellant Equipment Type: Tank (Arde HS D3780) Performance Technical Characteristics  $1.5 \times 10^3 \, \text{cm}^3$  (92 in<sup>3</sup>) (1)Volume:  $3.86 \times 10^6 \text{ N/m}^2 (560 \text{ s})$ (2) Maximum pressure: (3) (4) (5) (6) (7) (8) (9) (10)Power Average Power (watts): NA Maximum Power (watts): NA Minimum Power (watts): NA Nominal Voltage (volts): NA Maximum Voltage (volts): NA Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): Weight (kg): 1.3 (2.8 lb)  $1.5 \times 10^3 \ (0.053 \ \text{ft}^3)$ Volume (cc): Vibration Random (g, rms): 10.0 Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 333 (140° F) Minimum (<sup>o</sup>K): 278 ( 40° F)

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 360 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): 5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 0) Test and Evaluation (\$1000): Unit Production (\$1000): 0 CER Reference Quantity (No.): Factor (N.D.): Schedule 0 1 Development Lead Time Constant (months): Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): 0 \_ Qualification Lead Time Variable (months): 0 State-of-Art Factor (N.D.): 1.0

```
Subsystem:
                   APS (1102)
Configurations:
                    Monopropellant
Equipment Type: Tank (PSI 80156-1)
Performance
   Technical Characteristics
                                    6.88 \times 10^3 \text{ cm}^3 \text{ (420 in}^3\text{)}
      (1)
           Volume:
                                    4. 21 \times 10^6 \text{ N/m}^2 (610 psia)
      (2)
           Maximum pressure:
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
  Power
      Average Power (watts):
                                    NA
      Maximum Power (watts):
                                    NA
      Minimum Power (watts):
                                    NA
      Nominal Voltage (volts):
                                    NA
     - Maximum Voltage (volts):
                                    NA
      Minimum Voltage (volts):
                                    NΑ
      Converter/Inverter
       Requirement (flag):
  Weight (kg):
                                    1.3 (2.9 lb)
                                    6.8 \times 10^3 (0.24 ft<sup>3</sup>)
  Volume (cc):
  Vibration
      Random (g, rms):
     Non-Random (g):
  Temperature
     Maximum (<sup>O</sup>K):
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No. ): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): . Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): Development Lead Time Variable (months): 0, , Qualification Lead Time Constant (months): 0 · Qualification Lead Time Variable (months): $0 \cdot \cdot$ State-of-Art Factor (N.D.): 1.0

APS (1103) Subsystem: . Configurations: Monopropellant Tank (PSI 80177-1) Equipment Type: Performance Technical Characteristics  $3.851 \times 10^4 \text{ cm}^3$  (2350 in.<sup>3</sup>) Volume: (1) $2.76 \times 10^6 \text{ N/m}^2$  (400 psia) **-**(2) Maximum pressure: (3) (4)(5) (6) (7)(8) (9)(10)Power Average Power (watts): NA Maximum Power (watts): NA Minimum Power (watts): NA Nominal Voltage (volts): NA · Maximum Voltage (volts): NAMinimum Voltage (volts): NA Converter/Inverter Requirement (flag): Weight (kg): 4,63 (10,2 lb)  $3.9 \times 10^4$  (1.36 ft<sup>3</sup> Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 333 (140°F) 278 ( 40° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 360 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): 2 Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): 0 0 Unit Production (\$1000): CER Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 0 Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): 0 Qualification Lead Time Variable (months): ٥, . State-of-Art Factor (N.D.): 1

APS (1104) Subsystem: Configurations: Monopropellant Tank (Arde E3848) Equipment Type: Performance Technical Characteristics  $4.547 \times 10^4 \text{ cm}^3 (2775 \text{ in.}^3)$ Volume: (1)  $2.41 \times 10^6 \text{ N/m}^2$  (350 psia) (2) Maximum pressure: (3)(4) (5) (6) (7)(8)(9) (10)Power NA Average Power (watts): Maximum Power (watts): NA Minimum Power (watts): ΝĄ Nominal Voltage (volts): NΑ NΑ Maximum Voltage (volts): Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): 7.7 (17.0 lb) Weight (kg):  $4.2 \times 10^4$  (1.60 ft<sup>3</sup> Volume (cc): Vibration 8.3 Random (g, rms): Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 333 (140<sup>o</sup> F)

Minimum (<sup>o</sup>K): 278 (40°F)

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): ligh Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec-1): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): 1 ' Sample Rate (sec<sup>-1</sup>): 8 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters 360 Failure Rate or Mean (x 10<sup>±</sup> 'hr): Standard Deviation (x 10<sup>+9</sup> hr) 1.0 Dormancy Factor (N.D.): 3 Total Redundant Elements (No.) Cost :0 Design Engineering (\$1000): Test and Evaluation (\$1000): CÉR Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule 0 Development Lead Time Constant (months): 0 Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

APS (1105) Subsystem: Configurations: Monopropellant Tank (PSI 80112-115) Equipment Type: Performance Technical Characteristics  $9.144 \times 10^4 \text{ cm}^3 \cdot (5580 \text{ in.}^3)$ Volume: (1) $2.41 \times 10^6 \, \text{N/m}^2 \, (350 \, \text{psia})$ Maximum pressure: (2) (3) (4)(5) (6) **(7)** (8)(9) (10)Power Average Power (watts): NA NΑ Maximum Power (watts): NA Minimum Power (watts): Nominal Voltage (volts): NA Maximum Voltage (volts): NANA Minimum Voltage (volts): Converter/Inverter Requirement (flag): 7.85 (17.3 lb) Weight (kg):  $9.15 \times 10^4$  (3.23 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 322 (120° F) Maximum (<sup>o</sup>K): 278 ( 40° F) Minimum (<sup>o</sup>K):

# CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry "Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> h Standard Deviation (x-10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): 0 CER ' Reference Quantity (No.): 1 . Factor (N.D.): Schedule Development Lead Time Constant (months): . 0 Development Lead Time Variable (months): Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): State-of-Art Factor (N.D.):

Performance (continued)

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Subsystem:
                        APS (1201)
 Configurations:
                        Monopropellant
                         Fill and Drain Valve (TRW DSP)
 Equipment Type:
Performance
     Technical Characteristics
                                       3.55 \times 10^6 \text{ N/m}^2 (515 psia)
              Maximum pressure:
        (1)
        (2)
        (3)
       (4)
       (5)
       (6)
       \overline{(7)}
       (8)
       (9)
      (10)
    Power
       Average Power (watts):
                                       NA
       Maximum Power (watts):
                                       NA
       Minimum Power (watts):
                                       NA ·
       Nominal Voltage (volts):
                                       NΑ
       Maximum Voltage (volts):
                                       NA
       Minimum Voltage (volts):
                                       NA
       Converter/Inverter
         Requirement (flag):
    Weight (kg):
                                       0.09(0.21b)
                                       5.70. (0.02 \text{ ft}^3)
    Volume (cc):
    Vibration
       Random (g, rms):
       Non-Random (g):
    Temperature
      Maximum (<sup>o</sup>K):
                                       322 (120° F)
      Minimum (<sup>o</sup>K):
                                       278 ( 40° F)
   Pressure (kg/m<sup>2</sup>):
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#### Performance (continued)

### CDPI · Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): igh Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): ow Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 70 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1 Total Redundant Elements (No.): Cost 0 Design Engineering (\$1000): Test and Evaluation (\$1000): 0 Unit Production (\$1000):. O. Reference Quantity (No.): 1 Factor (N.D.): Schedule 0 Development Lead Time Constant (months): 0 Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0 1,0 State-of-Art Factor (N.D.):

Subsystem: APS (1202) Monopropellant Configurations: Fill and Drain Valve (Hughes 3181407-110) Equipment Type: Performance Technical Characteristics  $3.45 \times 10^6 \text{ N/m}^2$  (600 psia) Maximum pressure: (1)(2) (3) (4)(5) (6) (7)(8) (9) (10)Power NΑ Average Power (watts): NA · Maximum Power (watts): Minimum Power (watts): NANA Nominal Voltage (volts): Maximum Voltage (volts): NA NΑ Minimum Voltage (volts): Converter/Inverter Requirement (flag): 0.09 (0.21b)Weight (kg): 570 (0.02 ft<sup>3</sup>) Volume (cc): Vibration 21,5 Random (g, rms): Non-Random (g): Temperature 350 (170° F) Maximum (<sup>0</sup>K):  $222 (-60^{\circ} \text{ F})$ Minimum (<sup>o</sup>K):

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Safety . 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 70 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 1 Total Redundant Elements (No.): Cost 0 ' Design Engineering (\$1000): 0 Test and Evaluation (\$1000): 0 Unit Production (\$1000): 1 Reference Quantity (No.): 1 Factor (N.D.): Schedule 0 . Development Lead Time Constant (months) Development Lead Time Variable (months) 0 Qualification Lead Time Constant (months) 0 Qualification Lead Time Variable (months) 0 State-of-Art Factor (N.D.): 1.0

APS (1301) · Subsystem: Configurations: Bipropellant Thruster (Marquardt R-6C) Equipment Type: Performance Technical Characteristics Thrust level: 22 N (5.0 lb) (1)Pulse life: 30,000 cycles (2)  $1.31 \times 10^6 \text{ N/m}^2$  (190 psia) Inlet pressure: (3) $7.562 \times 10^5$  N-sec (170,000 lb-sec) Total impulse\*: (4)ISP\*: (5) Mixture ratio (N.D.)\*\*:1.5 (6)(7)(8)(9) (10)Power 1.0 Average Power (watts): Maximum Power (watts): 32.0 0 Minimum Power (watts): Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 0.68 (1.5 lb) Weight (kg):  $4.2 \times 10^3$  (0.15 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 394 (250° F) Maximum (<sup>o</sup>K):

278 ( 40° F) Minimum (<sup>o</sup>K):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry · Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 Total Redundant Element's (No.): Cost 203.0 Design Engineering (\$1000): 203.0 Test and Evaluation (\$1000): 16.0 Unit Production (\$1000): 3 Reference Quantity (No.): 1 Factor (N.D.): Schedule 4.5 Development Lead Time Constant (months): 1.2 Development Lead Time Variable (months): 2.5 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0.1 1.0 State-of-Art Factor (N.D.):

Subsystem: APS (1302) Bipropellant Configurations: Equipment Type: Thruster (Aerojet AJ10-181) Performance Technical Characteristics Thrust level: 22 N (5.0 lb) (1)50,000 cycles Pulse life: (2) $2.07 \times 10^6 \text{ N/m}^2 \text{ (300 psia)}$ Inlet pressure: (3)  $2.224 \times 10^4$  N-sec (5000 lb-sec) Total impulse\*: (4)300 sec ISP\*: (5) Mixture ratio (N.D.)\*\*:1.2 (6) (7)(8) (9) (10)Power 1.0 Average Power (watts): Maximum Power (watts): 30.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28,0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 0.54 (1.2 lb) Weight (kg):  $3.4 \times 10^3$  (0.12 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 322 (120° F) Maximum (<sup>O</sup>K): 266 (20° F) Minimum (<sup>o</sup>K):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 Total Redundant Elements (No.): Cost 171.0 Design Engineering (\$1000): 171.0 Test and Evaluation (\$1000): 13,2 Unit Production (\$1000): 3 Reference Quantity (No.): 1 Factor (N.D.): Schedule 4.5 Development Lead Time Constant (months): 1.1 Development Lead Time Variable (months): 2.5 Qualification Lead Time Constant (months): 0.1 Qualification Lead Time Variable (months): 1,0 State-of-Art Factor (N.D.):

APS (1303) Subsystem: Bipropellant Configurations: Thruster (Marquardt R-1E) Equipment Type: Performance Technical Characteristics Thrust level: 98 N (22.0 lb) (1)Pulse life: 30,000 cycles . (2)  $1.31 \times 10^6 \text{ N/m}^2$  (190 psia) Inlet pressure: (3) $1.5 \times 10^7$  N-sec  $(3.4 \times 10^6 \text{ lb-sec})$ Total impulse\*: (4)ISP\*: 276 sec. (5) Mixture ratio (N.D.)\*\*:1.6 (6) (7) (8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 32.0 0 Minimum Power (watts): Nominal Voltage (volts): 27.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 22.0 Converter/Inverter Requirement (flag): 1.3 (2.9 lb) Weight (kg):  $8.2 \times 10^3$  (0.29 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): 26.0 Non-Random (g): Temperature 394 (250° F) Maximum (<sup>o</sup>K):

Minimum (<sup>o</sup>K): 278 ( 40° F)

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec. 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 Total Redundant Elements (No.): Cost 333.0 Design Engineering (\$1000): 333.0 Test and Evaluation (\$1000): 26.8 Unit Production (\$1000): 3 Reference Quantity (No.): 1 . Factor (N.D.): Schedule 4.5 Development Lead Time Constant (months) 1.6 Development Lead Time Variable (months) Qualification Lead Time Constant (months) 2.5 0.2 Qualification Lead Time Variable (months) 1.0 State-of-Art Factor (N.D.):

Subsystem: APS (1304) Configurations: Bipropellant Equipment Type: Thruster (Bell MM P/Y) Performance Technical Characteristics Thrust level: 100 N (23.0 lb) (1)(2) Pulse life: 30,000 cycles  $1.67 \times 10^6 \text{ N/m}^2 \text{ (242 psia)}$ Inlet pressure: (3)  $2.002 \times 10^4$  N-sec (4500 lb-sec) Total impulse\*: (4)ISP\*: 288 sec (5) Mixture ratio (N.D.)\*\*:1.6 (6) (7)(8)(9) (10)Power 1.0 · Average Power (watts): Maximum Power (watts): 30.0 0 Minimum Power (watts): Nominal Voltage (volts): 27.0 Maximum Voltage (volts): 30.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 1.2 (2.7 lb)  $7.6 \times 10^3 \quad (0.27 \text{ ft}^3)$ Volume (cc): Vibration. Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 303 (85° F) 289 (60° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters
\*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 5 · Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 Total Redundant Elements (No.): Cost 315.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 315.0 25.1 Unit Production (\$1000): Reference Quantity (No.): 3 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 4.5 Development Lead Time Variable (months): 1.5 2.5 Qualification Lead Time Constant (months): 0.2 Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

Subsystem: APS (1305) Bipropellant Configurations: Equipment Type: Thruster (TRW MMBPS) Performance Technical Characteristics (1)Thrust level: 390 N (88.0 lb) (2)Pulse life (cycles): (3)Inlet pressure (psia):  $4.4 \times 10^6$  N-sec  $(1.0 \times 10^6 \text{ lb-sec})$ (4)Total impulse\*: (5) ISP\*: 295 sec (6) Mixture ratio (N.D.)\*\*:1.6 (7) (8) (9)(10)Power 1.0 Average Power (watts): Maximum Power (watts): 30.0 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32.0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): Weight (kg): 2.6 (5.8 lb)  $1.6 \times 10^4 \quad (0.58 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 333 (140° F) Maximum (<sup>o</sup>K): 278 ( 40° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.) Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 Total Redundant Elements (No.): Cost 560.0 Design Engineering (\$1000): 560.0 Test and Evaluation (\$1000): 46.1 Unit Production (\$1000): 3 .. Reference Quantity (No.): 1 Factor (N.D.): Schedule 4,5 Development Lead Time Constant (months): 1,9 Development Lead Time Variable (months): 2.5 Qualification Lead Time Constant (months): 0.3 Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

Subsystem:		APS (1306)			
Configurations:		Bipropellant			
Equipment Type:		Thruster (Marquardt R-4D)			
Performanc	ce				
Technica	al Characte	ristics			
(1)	Thrust level:		445 N	(100.0 lb)	
. (2)	Pulse life:		•	cycles	
(3)	Inlet pressure:				(190 psia)
(4)	Total impulse*:		$8.9 \times 3$	10 <sup>6</sup> N-sec	$(2.0 \times 10^6 \text{ lb-se})$
(5)	ISP*:	,	290 se	С	
(6)	1. (N. D. ) the 1. 6				
(7)					
(8)					
(9)			•		
(10)					
Power					
Average Power (watts):		(watts):	1.0	•	
Maximum Power (watts):		r (watts):	112.0		
Minimum Power (wat		r (watts):	0		
Nominal Voltage (volts):			27.0		
Maximum Voltage (volt		ge (volts):	32.0		
Minimum Voltage (vo		ge (volts):	22.0		
	erter/Inve quirement				
Weight (kg):			2.2 (	4.9 1b) .	
Volume (cc):			1.4 x	10 <sup>4</sup> (0.49	ft <sup>3</sup> )
Vibratio	on				
Random (g, rms):					
Non-	Random (g)	):			
Temper	ature			0	
Maximum ( <sup>O</sup> K):				(225° F)	
Minimum ( <sup>o</sup> K):			278	( 40 <sup>0</sup> F)	
Pressu	re (kg/m <sup>2</sup> ):		•		
				_	

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

#### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): , Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 5 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1700 Standard Deviation (x 10<sup>+9</sup> hr): 0.1 Dormancy Factor (N.D.): 12 -Total Redundant Elements (No.): Cost 498.0 Design Engineering (\$1000): 498.0 Test and Evaluation (\$1000): 40.4 Unit Production (\$1000): 3 Reference Quantity (No.): 1 Factor (N.D.): Schedule 4.5 Development Lead Time Constant (months): . 1.9 Development Lead Time Variable (months): 2.5. Qualification Lead Time Constant (months): 0.3 Qualification Lead Time Variable (months): State-of-Art Factor (N.D.): 1.0

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APS (1307)
Subsystem:
Configurations:
                         Bipropellant
                         Thruster (Rocketdyne RS-2101-C)
Equipment Type:
Performance
   Technical Characteristics
      (1)
             Thrust level:
                                       1330 N (300, 0 lb)
      (2)
             Pulse life (cycles):
                                       1.59 \times 10^6 \text{ N/m}^2 (230 psia)
      (3)
             Inlet pressure:
                                       1.3 \times 10^7 N-sec (3.0 \times 10^6 \text{ lb-sec})
      (4)
             Total impulse*:
             ISP*:
                                       293 sec
      (5)
             Mixture ratio (N.D.)**:1.5
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                        1.0
                                       13.0
      Maximum Power (watts):
      Minimum Power (watts):
                                        0
      Nominal Voltage (volts):
                                       28.0
      Maximum Voltage (volts):
                                       32.0
      Minimum Voltage (volts):
                                       24.0
      Converter/Inverter
        Requirement (flag):
  Weight (kg):
                                       7.03 (15.5 lb)
                                       4.2 \times 10^4 (1.5 ft<sup>3</sup>)
  Volume (cc):
  Vibration
      Random (g, rms):
     Non-Random (g):
  Temperature
                                       303 (85° F)
     Maximum (<sup>o</sup>K):
     Minimum (<sup>o</sup>K):
                                       286 (55° F)
  Pressure (kg/m<sup>2</sup>):
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<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters \*\*Applicable to bipropellant thrusters only

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Performance (continued)
   CDPI
      Power Switching Commands (No.):
      Time Tagged Commands (No.):
      Other Commands (No.):
      High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
Safety
                                                     5
   Failure Model (flag):
   Fäilure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                 1700
      Standard Deviation (x 10<sup>+9</sup> hr):
                                                    0.1
      Dormancy Factor (N.D.):
                                                    12
   Total Redundant Elements (No.):
Cost
                                                 1200.0
   Design Engineering ($1000):
                                                 1200.0
   Test and Evaluation ($1000):
                                                   100.0
   Unit Production ($1000):
   Reference Quantity (No.):
   Factor (N.D.):
Schedule
                                                     4.5
   Development Lead Time Constant (months):
                                                     3.7
   Development Lead Time Variable (months):
                                                     2.5
   Qualification Lead Time Constant (months):
                                                     0.8
   Qualification Lead Time Variable (months):
                                                     1.0
   State-of-Art Factor (N.D.):
```

Subsystem: APS (1308) Configurations: Bipropellant Thruster (Rocketdyne SS/RCS) Equipment Type: Performance Technical Characteristics Thrust level: 2670 N .(600.01b) (1)Pulse life: 200,000 cycles (2) $2.07 \times 10^6 \text{ N/m}^2$  (300 psia) · Inlet pressure: (3) $2.67 \times 10^8$  N-sec  $(6.0 \times 10^7 \text{ lb-sec})$ Total impulse\*: (4)ISP\*: 295 sec (5) Afterday and the ANT TO NAME OF (6) (7)(8) (9) (10).Power 1.0 Average Power (watts): Maximum Power (watts): 12.0 0 Minimum Power (watts): Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 7.89 (17.4 lb)  $4.8 \times 10^4 \ (1.7 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): 55.0 Non-Random (g): Temperature 316 (110° F) Maximum (<sup>o</sup>K): 278 ( 40° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

<sup>\*</sup>Applicable to monopropellant and bipropellant thrusters
\*\*Applicable to bipropellant thrusters only

```
Performance (continued)
   CDPI
      Power Switching Commands (No.):
      Time Tagged Commands (No.):
      Other Commands (No.):
      High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
Safety
                                                     5
   Failure Model (flag):
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                  1700
      Standard Deviation (x 10<sup>+9</sup> hr):
                                                     0.1
      Dormancy Factor (N.D.):
                                                    12
   Total Redundant Elements (No.):
Cost
                                                  1300.0
   Design Engineering ($1000):
                                                  1300,0
   Test and Evaluation ($1000):
                                                   112.0
   Unit Production ($1000):
                                                     3
   Reference Quantity (No.):
                                                     1
   Factor (N.D.):
Schedule
                                                    4.5
   Development Lead Time Constant (months):
                                                     3.7
   Development Lead Time Variable (months): .
   Qualification Lead Time Constant (months):
                                                     2.5
                                                     0.8
   Qualification Lead Time Variable (months):
                                                    - 1..0
  State-of-Art Factor (N.D.):
```

```
APS (1401)
Subsystem:
Configurations:
                        Bipropellant
Equipment Type:
                        Isolation Valve (latching solenoid) (Marquardt T8700)
Performance
   Technical Characteristics
                                      2.34 \times 10^6 \text{ N/m}^2 (340 psia)
             Maximum pressure:
      (1)
                                       0.04 \text{ cm}^2 (0.006 \text{ in.}^2)
      121
             Tlow area:
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                        0
      Maximum Power (watts):
                                       56
      Minimum Power (watts):
                                        0
      Nominal Voltage (volts):
                                       28.0
      Maximum Voltage (volts):
                                       32.0
      Minimum Voltage (volts):
                                       24.0
      Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                       0.3 (0.6 lb)
                                       1.7 \times 10^3 (0.06 ft<sup>3</sup>)
   Volume (cc):
   Vibration.
     Random (g, rms):
      Non-Random (g):
   Temperature
                                       380 (225° F)
     Maximum (<sup>o</sup>K):
                                       278 ( 40° F)
     Minimum (<sup>o</sup>K):
```

```
Performance (continued)
    CDPI
    Power Switching Commands (No.):
    Time Tagged Commands (No.):
       Other Commands (No.):
      High Rate Telemetry
      'Analog Points (No.):
        Digital Points (No.):
         Sample Rate. (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
Safety
                                                   . 1
   Failure Model (flag):
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                   200
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                     1.0
   Total Redundant Elements (No.):
                                                    . 7 ·
Cost
   Design Engineering ($1000):
   Test and Evaluation ($1000):
   Unit Production ($1000):
                                                     0
   Reference Quantity (No.):
                                                   , · 1·
   Factor (N.D.):
                                                     1
Schedule
   Development Lead Time Constant (months):
                                                     0
   Development Lead Time Variable (months):
                                                   0
 . Qualification Lead Time Constant (months):
   Qualification Lead Time Variable (months);
  State-of-Art Factor (N.D.):
```

```
Subsystem:
Configurations:
                        Bipropellant
Equipment Type:
                        Isolation Valve (latching solenoid) (Marquardt 22700)
Performance
   Technical Characteristics
             Maximum pressure: -2.48 \times 10^6 \text{ N/m}^2 (360 psia)
      (1)
                                       0.62 \text{ cm}^2 (0.096 \text{ in.}^2)
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                        0
      Maximum Power (watts):
                                       60.0
      Minimum Power (watts):
                                        0
      Nominal Voltage (volts):
                                       27.0
      Maximum Voltage (volts):
                                       30.0
      Minimum Voltage (volts):
                                       24,0
      Converter/Inverter
        Requirement (flag):
                                       0.59 (1.3 lb) .
  Weight (kg):
                                       3.7 \times 10^3 (0.13 ft<sup>3</sup>)
   Volume (cc):
   Vibration .
      Random (g, rms):
      Non-Random (g):
  Temperature
                                       322 (120° F)
     Maximum (<sup>o</sup>K):
                                       278 ( 40° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

APS (1402) .

## Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry 1 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): . Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 200 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 7 Total Redundant Elements (No.): Cost 0 Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): 0 · · Development Lead Time Variable (months): Ò Qualification Lead Time Constant (months): 0 Qualification Lead Time Variable (months): 0 State-of-Art Factor (N.D.): , 1.0

Subsystem: APS (1403) Bipropellant Configurations: Isolation Valve (latching solenoid) Equipment Type: (Consolidated Controls 73295) Performance Technical Characteristics  $2.48 \times 10^6 \text{ N/m}^2$  (360 psia) Maximum pressure: (1)  $0.13 \text{ cm}^2 (0.02 \text{ in.}^2)$ Flow area: (2) (3) (4)(5) (6) (7)(8)(9) (10)Power Average Power (watts): 0 Maximum Power (watts): 108.0 Minimum Power (watts): 0 25.0 Nominal Voltage (volts): 30.0 Maximum Voltage (volts): Minimum Voltage (volts): 20.0 Converter/Inverter Requirement (flag) 1.2 (2.7 lb) Weight (kg):  $7.6 \times 10^3 \ (0.27 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): 23.2 Non-Random (g): Temperature 305 (90°F) Maximum (<sup>o</sup>K): 244 (-20° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 100 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000): 0 Test and Evaluation (\$1000): Unit Production (\$1000): 0 Reference Quantity (No.): 1 1 Factor (N.D.): Schedule 0 Development Lead Time Constant (months): 0 Development Lead Time Variable (months): 0... Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0.

State-of-Art Factor (N.D.):

APS (1404) Subsystem: Configurations: Bipropellant Equipment Type: Isolation Valve (latching solenoid) (Valcor 27700-61) Performance Technical Characteristics  $3.00 \times 10^6 \, \text{N/m}^2$  (435 psia) Maximum pressure: (1) $2.9 \text{ cm}^2 (0.45 \text{ in}^2)$ (2)Flow area: (3) (4)(5) (6) (7) (8)(9)(10)Power Average Power (watts): 0 Maximum Power (watts): 110.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 2, 7 (6, 0 lb) Weight (kg):  $1.7 \times 10^4 \ (0.6 \text{ ft}^3)$ Volume (cc): Vibration 15.0 Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K):  $\cdot 322 \ (120^{\circ} \text{ F})$ Minimum (<sup>o</sup>K): 266 (  $20^{\circ} \dot{F}$ )

```
Performance (continued)
    CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
       Other Commands (No.):
     High Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
Safety
   Failure Model (flag):
                                                     1
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                   100
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                     1.0
   Total Redundant Elements (No.)
                                                     7
Cost
   Design Engineering ($1000):
   Test and Evaluation ($1000):
   Unit Production ($1000):
   Reference Quantity (No.):
                                                     1
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months):
                                                     0
                                                     0 '
   Development Lead Time Variable (months):
   Qualification Lead Time Constant (months):
                                                     Ō
   Qualification Lead Time Variable (months):
   State-of-Art Factor (N.D.):
```

Subsystem: APS (1405) Configurations: Bipropellant Equipment Type: Isolation Valve (pyrotechnic) (Pyronetics 1349) Performance Technical Characteristics Maximum pressure:  $2.758 \times 10^7 \text{ N/m}^2$  (4000 psia) (1)  $7.7 \text{ cm}^2 (1.2 \text{ in}^2)$ Flow area: (2) (3)(4)(5) (6) (7) (8) (9) (10)Power Average Power (watts): 0 140.0 Maximum Power (watts): 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 0.68 (1.5 lb) Weight (kg):  $4.2 \times 10^3$  (0.15 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 325 (125° F) Minimum (<sup>o</sup>K): 219 (-65° F)

## CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry . Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 100 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): Total Redundant Elements (No.): 7 Cost 0 . Design Engineering (\$1000): 0 Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): 1 1 Factor (N.D.): Schedule Development Lead Time Constant (months) 0 Development Lead Time Variable (months) 0 Qualification Lead Time Constant (months) 0 Qualification Lead Time Variable (months) 0 State-of-Art Factor 'N D' ). 1.0

Performance (continued)

Subsystem: APS (1501) Configurations: Bipropellant Equipment Type: Filter (Wintec 15267) Performance Technical Characteristics  $2.76 \times 10^6 \text{ N/m}^2$  (400 psia) (1)Maximum pressure:  $1.37 \times 10^8 \, \text{N/(kg-m)}^2 \, (4.08 \, \text{psi sec}^2/1b^2)$ (2) Flow resistance: (3)(4)(5) (6) (7) (8)(9)(10)Power Average Power (watts): NΑ Maximum Power (watts): NA Minimum Power (watts): NANominal Voltage (volts): NΑ Maximum Voltage (volts): NA Minimum Voltage (volts): NAConverter/Inverter Requirement (flag): Weight (kg): 1.4 (3.0 lb)  $8.5 \times 10^3 \quad (0.3 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 333 (140° F)

278 ( 40° F)

Minimum (<sup>o</sup>K):

# Performance (continued) CDPI Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry .. Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits):. Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 ' Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 10. Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): . 1.0 Total Redundant Elements (No.): 7 Cost Design Engineering (\$1000): Test and Evaluation (\$1000): 0 Unit Production (\$1000): 0 4 ľ Reference Quantity (No.): ·Factor (N.D.): 1 Schedule . 1 Development Lead Time Constant (months): 0 . Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): State-of-Art Factor (N D 10)

APS (1601) Subsystem: Configurations: Bipropellant Equipment Type: Tank (Arde MM-3) Performance Technical Characteristics Volume:  $1.27 \times 10^4 \text{ cm}^3 (775 \text{ in}^3)$ Maximum pressure:  $5.65 \times 10^6 \text{ N/m}^2 (820 \text{ psia})$ (1)(2) (3)(4)(5) (6)(7)(8)(9)(10)Power Average Power (watts): NA Maximum Power (watts): NAMinimum Power (watts): NA Nominal Voltage (volts): NAMaximum Voltage (volts): NA Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): Weight (kg): 2.9 (6.5 lb)  $1.3 \times 10^4 \quad (0.47 \text{ ft}^3)$ Volume (cc): Vibration Random (g, 'rms): 8.3 Non-Random (g): Temperature Maximum (<sup>o</sup>K): 700 (800° F)

266 ( 20° F)

Minimum (<sup>o</sup>K):

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): . Digital Points (No.): Sample Rate (sec-1): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 360 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): .1.0 5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): CER · Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): State-of-Art Factor (N.D.): 1.0

Subsystem: APS (1602)

Configurations: Bipropellant

Equipment Type: Tank (Arde E3840)

#### Performance

Technical Characteristics.

- (1) Volume:  $4.424 \times 10^4 \text{ cm}^3 (2700 \text{ in}^3)$
- (2) Maximum pressure:  $2.41 \times 10^6 \text{ N/m}^2$  (350 psia)
- (3)
- (4)
- (5)
- (6)
- (7)
- (8)
- (9)
- (10)

#### Power

Average Power (watts): NA

Maximum Power (watts): NA

Minimum Power (watts): NA

Nominal Voltage (volts): NA

Maximum Voltage (volts): NA

Minimum Voltage (volts): NA

Converter/Inverter Requirement (flag):

Weight (kg): .7 (17.0 lb)

Volume (cc):  $5.01 \times 10^4$  (1.77 ft<sup>3</sup>

Vibration

Random (g, rms): 8.3

Non-Random (g):

Temperature

Maximum (°K): 700 (800°F)

Minimum (<sup>o</sup>K): 266 (20<sup>o</sup> F)

```
Performance (continued)
    CDPI
       Power Switching Commands (No.)
       Time Tagged Commands (No.):
       Other Commands (No.):
       High Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
                                                  2
       Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                  1
         Word Length (bits):
                                                 8
Safety
   Failure Model (flag):
                                                 1
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                               360
      Standard Deviation (x 10<sup>+9</sup>, hr):
      Dormancy Factor (N.D.):
                                                 1.0
   Total Redundant Elements (No.):
                                                 2 __,
Cost
   Design Engineering ($1000):
   Test and Evaluation ($1000):
                                                 0
   Unit Production ($1000):
                                                           CER
   Reference Quantity (No.):
   Factor (N.D.):
Schedule
  Development Lead Time Constant (months):
   Development Lead Time Variable (months):
   Qualification Lead Time Constant (months):
   Qualification Lead Time Variable (months):
  State-of-Art Factor (N.D.):
                                                 1.0
```

```
Subsystem:

    Configurations:

                       Bipropellant
 Equipment Type:
                       Tank (PSI 80123-1)
 Performance
    Technical Characteristics
                                       1.131 \times 10^5 \text{ cm}^3 \text{ (6900 in}^3)
       (1)
              Volume:
                                       1.38 \times 10^6 \,\mathrm{N/m}^2 (200 psia)
       (2)
              Maximum pressure:
       (3)
       (4)
       (5)
       (6)
       (7)
       (8)
       (9)
      (10)
    Power
       Average Power (watts):
                                       NA
       Maximum Power (watts):
                                       NA
       Minimum Power (watts):
                                       NA
       Nominal Voltage (volts):
                                       NA
       Maximum Voltage (volts):
                                       NA
       Minimum Voltage (volts):
                                       NA
       Converter/Inverter
         Requirement (flag):
    Weight (kg):
                                       4.76 (10.5 lb)
                                       1.16 \times 10^5 (4.10 ft<sup>3</sup>)
    Volume (cc):
    Vibration
       Random (g, rms):
      Non-Random'(g):
    Temperature
      Maximum (<sup>o</sup>K):
                                       344 (160°F)
      Minimum (<sup>o</sup>K):
                                       266 ( 20° F)
   Pressure (kg/m<sup>2</sup>):
```

APS (1603)

```
Performance (continued)
    CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
       Other Commands (No.):
      High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
                                                  2
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                  1
         Word Length (bits):
                                                  8
Safety
                                                 _ 1
   Failure Model (flag):
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                               360
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                  1.0
   Total Redundant Elements (No.):
                                                  3
Cost
   Design Engineering ($1000):
                                                  0.
                                                  0
   Test and Evaluation ($1000):
                                                  0
                                                          CER.
   Unit Production ($1000):
   Reference Quantity (No.):
                                                  1
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months): 0
   Development Lead Time Variable (months):
   Qualification Lead Time Constant (months):
   Qualification Lead Time Variable (months):
  State-of-Art Factor (N.D.):
```

1.0

APS (1604) Subsystem: Bipropellant Configurations: Tank (PSI 80140-1) Equipment Type: Performance Technical Characteristics 2.  $130 \times 10^5 \text{ cm}^3$  (13,000 in<sup>3</sup>) 2.  $07 \times 10^6 \text{ N/m}^2$  (300 psia) Volume (1)Maximum pressure: (2) (3)(4)(5) (6)(7)(8)(9)(10)Power Average Power (watts): NΑ Maximum Power (watts): NΑ Minimum Power (watts): NΑ Nominal Voltage (volts): NΑ Maximum Voltage (volts): NAMinimum Voltage (volts): NA Converter/Inverter Requirement (flag): 10, 2 (22, 5 lb) Weight (kg):  $2.20 \times 10^5$  (7.78 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 344 (160<sup>o</sup> F) Minimum (<sup>o</sup>K): 266 (20<sup>o</sup> F)

.. . 2.

```
Performance (continued)
   CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
      Other Commands (No.):
      High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
                                                     2
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                     1
         Word Length (bits):
                                                     8
Safety
   Failure Model (flag):
                                                     1
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                  360
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                     1.0
   Total Redundant Elements (No.):
                                                     3
Cost
   Design Engineering ($1000):
                                                     0
   Test and Evaluation ($1000):
                                                     0
                                                            CER
   Unit Production ($1000):
                                                     0
   Reference Quantity (No.):
                                                     1
   Factor (N.D.):
                                                     1 j
Schedule
   Development Lead Time Constant (months):
                                                    0
   Development Lead Time Variable (months):
                                                    0
   Qualification Lead Time Constant (months):
                                                     0
                                                     0 -
   Qualification Lead Time Variable (months):
                                                     1.0
```

Subsystem: APS (1605) Configurations: Bipropellant Equipment Type: Tank (Arde) Performance Technical Characteristics  $5.080 \times 10^5 \text{ cm}^3 (31,000 \text{ in}^3)$ (1)Volume: (2) Maximum pressure: (3) (4)(5) (6) (7)(8)(9) (10)Power NΑ Average Power (watts): Maximum Power (watts): NANA Minimum Power (watts): Nominal Voltage (volts): NAMaximum Voltage (volts): NA Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): 68.0 (150.0 lb) Weight (kg):  $5.24 \times 10^5$  (18.5 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 700 (800°F) 266 ( 20° F) Minimum (<sup>o</sup>K):

```
Performance (continued)
     CDPI
        Power Switching Commands (No.):
        Time Tagged Commands (No.):
        Other Commands (No.):
        High Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
          Sample Rate (sec<sup>-1</sup>):
          Word Length (bits):
       Low Rate Telemetry
          Analog Points (No.):
                                                     2
          Digital Points (No.):
          Sample Rate (sec<sup>-1</sup>):
                                                     1
          Word Length (bits):
                                                     8
Safety
    Failure Model (flag):
                                                     1
    Failure Parameters
       Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                   360
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                     1.0
   Total Redundant Elements (No.):
                                                     3
Cost
   Design Engineering ($1000):
                                                     0)
   Test and Evaluation ($1000):
                                                    0
   Unit Production ($1000):
                                                              CER
   Reference Quantity (No.):
                                                    1
   Factor (N.D.):
Schedule
  Development Lead Time Constant (months):
  Development Lead Time Variable (months):
  Qualification Lead Time Constant (months):
  Qualification Lead Time Variable (months):
  State-of-Art Factor (N.D.):
                                                   , 1, 0
```

```
Subsystem:
                    APS (1701)
Configurations:
                     Bipropellant
Equipment Type:
                    Fill and Drain Valve (Pyronetics 1831)
Performance
   Technical Characteristics
             Maximum pressure: 3.72 \times 10^6 \text{ N/m}^2 (540 psia)
      (1)
      (2)
    , (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
  Power
     Average Power (watts):
                                    NA
     Maximum Power (watts):
                                    NA
     Minimum Power (watts):
                                    NA
     Nominal Voltage (volts):
                                    NA
     Maximum Voltage (volts):
                                    NA
     Minimum Voltage (volts):
                                    NA
     Converter/Inverter
        Requirement (flag):
  Weight (kg):
                                    0.09(0.21b)
                                    570 (0.02 ft<sup>3</sup>)
  Volume (cc):
  Vibration
     Random (g, rms):
                                    14.8
     Non-Random (g):
  Temperature
     Maximum (<sup>o</sup>K):
                                    394 (250°F)
     Minimum (<sup>o</sup>K):
                                    233 (-40° F)
  Pressure (kg/m<sup>2</sup>):
```

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 70 Standard Deviation (x 10<sup>+9</sup> hr): ; 1. Ò Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000): 0 Test and Evaluation (\$1000): 0 ; Unit Production (\$1000): 0 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 0 Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): 0 -Qualification Lead Time Variable (months): 0 1.0 State-of-Art Factor (N.D.):

DP (0101) Subsystem: General Purpose Processors Configurations: General Purpose Processor (CDC 469) Equipment Type: Performance Technical Characteristics 160 (kips) Instruction rate: (1) 16 (bits) Word length: (2) (3) (4)(5) (6) (7) (8)(9) (10)Power Average. Power (watts): 15.0 Maximum Power (watts): 15.0 Minimum Power (watts): Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 1.3 (2.8 lb) 990 (0.035 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100°F) Maximum (<sup>o</sup>K): 275 ( 35° F) Minimum (<sup>o</sup>K):

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): 20 Other Commands (No.): High Rate Telemetry Analog Points (No.): · 6 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 15,000 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): 2 Total Redundant Elements'(No.): Cost Design Engineering (\$1000): 2500 Test and Evaluation (\$1000): 1000 Unit Production (\$1000): 650 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 24.0 Development Lead Time Variable (months): 8.0 Qualification Lead Time Constant (months): 6, 0 Qualification Lead Time Variable (months): 4. 7 State-of-Art Factor (N.D.):

2.0

Subsystem: DP (0102)

Configurations: General Purpose Processors.

Equipment Type: General Purpose Processor (RCA MARC)

#### Performance

#### Technical Characteristics

- (I) Instruction rate: 200 kips
- (2) Word length: 32 bits
- (3)
- (4)
- (5)
- (6)
- (7)
- (8)
- (9)
- (10)

#### Power

Average Power (watts): 20.0

Maximum Power (watts): 20.0

Minimum Power (watts): 0

Nominal Voltage (volts): 28.0

Maximum Voltage (volts): 32.0

Minimum Voltage (volts): 24.0

Converter/Inverter Requirement (flag):

Weight (kg): 6.8 (15.0 lb)

Volume (cc):  $2.1 \times 10^3$  (0.075 ft<sup>3</sup>)

#### Vibration

Random (g, rms):

Non-Random (g):

#### Temperature

Maximum (<sup>o</sup>K): 311 (100<sup>o</sup> F)

Minimum (<sup>o</sup>K): 275 (35<sup>o</sup> F)

# Performance (continued)

## CDPI

Power Switching Commands (No.):	
Time Tagged Commands (No.):	4
Other Commands (No.):	20 .
High Rate Telemetry	
Analog Points (No.):	<sub>.</sub> 6
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Low Rate Telemetry	
Analog Points-(No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
Safety	
Failure Model (flag):	1
Failure Parameters	
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	15,.000
Standard Deviation (x $10^{+9}$ hr):	
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	2
Cost	•
Design Engineering (\$1000):	1850
Test and Evaluation (\$1000):	1150
Unit Production (\$1000):	1000
Reference Quantity (No.): :	1
Factor (N.D.):	1
Schedule	, ,
Development Lead Time Constant (months)	; 24. 0
Development Lead Time Variable (months)	): 8.0
Qualification Lead Time Constant (months	): 6.0°
Qualification Lead Time Variable (months	): 4 <u>.</u> 1
State-of-Art Factor (N.D.):	2.0

Subsystem: DP (0103)

Configurations: General Purpose Processors

Equipment Type: General Purpose Processor (Autonetics D216)

#### Performance

#### Technical Characteristics

(1) Instruction rate: 250 kips

(2) Word length: 16 bits

15011

(3)

(4)

(5)

(6)

(7)

(8)

(9) ·

(10)

#### Power

Average Power (watts): 80.0

Maximum Power (watts): 80.0

Minimum Power (watts): 0

Nominal Voltage (volts): 28.0

Maximum Voltage (volts): 32.0

Minimum Voltage (volts): 24.0

Converter/Inverter

Requirement (flag):

Weight (kg): 6.8 (15.0 lb)

Volume (cc):  $2.0 \times 10^3$  (0.069 ft<sup>3</sup>)

#### Vibration

Random (g, rms):

Non-Random (g):

#### Temperature

Maximum ( $^{\circ}$ K): 311 (100 $^{\circ}$  F)

Minimum (<sup>o</sup>K): 275 (35<sup>o</sup>F)

## Performance (continued)

#### CDPI

```
Power Switching Commands (No.):
      Time Tagged Commands (No.):
      Other Commands (No.):
                                                      20
      High Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                       1
                                                       8
         Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
         Word Length (bits):
Safety
                                                       1
   Failure Model (flag):
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                 .15,000
      Standard Deviation (x 10<sup>+9</sup> hr):
                                                       0.5
      Dormancy Factor (N.D.):
                                                       2
   Total Redundant Elements (No.):
Cost
                                                    1850
   Design Engineering ($1000):
                                                    1150
   Test and Evaluation ($1000):
                                                    1000
   Unit Production ($1000):
                                                       1
   Reference Quantity (No.):
                                                        1
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months):
                                                      24.0
   Development Lead Time Variable (months):
                                                       8.0
   Qualification Lead Time Constant (months):
                                                        6.0
                                                      4. 1
   Qualification Lead Time' Variable (months):
                                                       2, 0
   State-of-Art Factor (N.D.):
```

```
Subsystem:
                     DP (0104)
Configurations:
                     General Purpose Processors
Equipment Type:
                     General Purpose Processor (Bunker Ramo 1018)
Performance
   Technical Characteristics
      (1)
             Instruction rate:
                                   300 kips
      (2)
             Word length: .
                                    16 bits
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                   40.0
      Maximum Power (watts):
                                   40.0
      Minimum Power (watts):
                                    0
      Nominal Voltage (volts):
                                   28.0
      Maximum Voltage (volts):
                                   32.0
      Minimum Voltage (volts):
                                   24.0
      Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                  5.4 (12.0 lb)
                                  2.94 \times 10^3 \quad (0.104 \text{ ft}^3)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
                                  311 (100° F)
     Maximum (<sup>o</sup>K):
     Minimum (<sup>o</sup>K):
                                  275 (35°F)
```

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 20 -High Rate Telemetry Analog Points (No:): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 15,000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 5,. Cost Design Engineering (\$1000): 2150 Test and Evaluation (\$1000): 1400 Unit Production (\$1000): 850 Reference Quantity (No.): 1 1 Factor (N.D.): Schedule 24.0 Development Lead Time Constant (months): Development Lead Time Variable (months): 8.0 Qualification Lead Time Constant (months): 6.0 Qualification Lead Time Variable (months): .4.8 State-of-Art Factor (N.D.):

2.-0

Subsystem: DP (0105) General Purpose Processors Configurations: 1 General Purpose Processor (Northrop RCTOT) Equipment Type: Performance Technical Characteristics Instruction rate: 500 kips (1)Word length: 24 bits (2) (3)(4)(5) (6) (7)(8) (9) (10)Power Average Power (watts): 50.0 Maximum Power (watts): 50.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 6.8 (15.0 lb) Weight (kg):  $2.5 \times 10^3 \ (0.087 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 311 (100° F)

Pressure (kg/m<sup>2</sup>):

Minimum (<sup>o</sup>K):

275 (35°F).

# Performance (continued)

# CDPI

Power Switching Commands (No.):	
Time Tagged Commands (No.):	
Other Commands (No.):	20
High Rate Telemetry	
Analog Points (No.):	6.
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Low Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
Safety	
Failure Model (flag):	1
Failure Parameters	•
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	15,000 -
Standard Deviation (x $10^{+9}$ hr):	
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	2
Cost	•
Design Engineering (\$1000):	<u> 2</u> 680
Test and Evaluation (\$1000):	1667
Unit Production (\$1000):	1000
Reference Quantity (No.):	. 1
Factor (N.D.):	1 .
Schedule	
Development Lead Time Constant (months):	24.0
Development Lead Time Variable (months):	9.0
Qualification Lead Time Constant (months):	6.0
Qualification Lead Time Variable (months):	5.9
State-of-Art Factor (N.D.):	2. 0
	<u>-</u>

Subsystem: DP (0106) Configurations: General Purpose Processors Equipment Type: General Purpose Processor (Autonetics D224) Performance Technical Characteristics (1)Instruction rate: 750 kips (2) Word length: 24 bits (3) (4)(5) (6) (7)(8) (9)(10)Power Average Power (watts): 140.0 Maximum Power (watts): 140.0 0 Minimum Power (watts): Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 11 (25.0 lb) Weight (kg): 820 (0.029 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature  $311 (100^{\circ} F)$ Maximum (<sup>o</sup>K): Minimum (<sup>o</sup>K): 275 ( 35° F)

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): 20 Other Commands (No.): High Rate Telemetry 6 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec -1): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 15,000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 2 Cost Design Engineering (\$1000): 3360 Test and Evaluation (\$1000): 2310 Unit Production (\$1000): 1400 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 24.0 Development Lead Time Variable (months): 10.0 Qualification Lead Time Constant (months): 6.0

^ 7.; 7 .

. 2.0

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

```
DP (0107)
Subsystem:
Configurations:
                    General Purpose Processors
Equipment Type:
                    General Purpose Processor (RCA SMARC)
Performance
   Technical Characteristics
      (1)
            Instruction rate:
                                  1000 kips
      (2)
            Word length:
                                    32 bits
      (3)
      (4)
     (5)
     (6)
     (7)
     (8)
     (9)
    (10)
  Power
     Average Power (watts):
                                  40.0
     Maximum Power (watts):
                                  40.0
     Minimum Power (watts):
                                   0
     Nominal Voltage (volts):
                                  28.0
     Maximum Voltage (volts):
                                  32.0
     Minimum Voltage (volts):
                                  24.0
     Converter/Inverter
        Requirement (flag):
                                  11 (25.0 lb)
  Weight (kg):
                                  2.1 \times 10^3 (0.075 ft<sup>3</sup>)
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
     Maximum (<sup>o</sup>K):
                                  311 (100°F)
```

Pressure (kg/m<sup>2</sup>):

Minimum (<sup>o</sup>K):

275 (35°F)

## Performance (continued) · CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 20 High Rate Telemetry Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec-1): 1 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>-7</sup> hr): 15,000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 2 Cost Design Engineering (\$1000): 3960 Test and Evaluation (\$1000): 2725 Unit Production (\$1000): 1400 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 24. ( Development Lead Time Variable (months): 13. (

6. (

9. :

2. (

Qualification Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

Subsystem: DP (0108) Configurations: General Purpose Processors Equipment Type: General Purpose Processor (CDC AMPP) Performance Technical Characteristics · (1) Instruction rate: 1200 kips (2) Word length: 32 bits (3) (4)(5) (6) (7) (8)(9) (10)Power Average Power (watts): 100.0 Maximum Power (watts): 100.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 9.1 (20.0 lb)  $2.0 \times 10^3$  (0.069 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 311 (100° F) Minimum (<sup>o</sup>K): 275 (35°F)

2-223

# Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 20 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec - 1): 1 Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 15,000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 4300 Test and Evaluation (\$1000): 2850 Unit Production (\$1000): 1200 Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): 24.0 Development Lead Time Variable (months): 14.0 Qualification Lead Time Constant (months): 6.0 Qualification Lead Time Variable (months): 9.8 State-of-Art Factor (N.D.):

2:0

Configurations: A11 Equipment Type: Digital Telemetry Unit Performance Technical Characteristics (1)Bit rate: 0.250 kbps (2) Word length: 8 bits 32 Number of main frame words: (3) 4 Number of subframes: (4)128 (5) Number of words per subframe: Digital multiplexer (yes/no): Yes (1) (6) (7)(8)(9) (10)Power Average Power (watts): 3, 0 Maximum Power (watts): 3.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 23.0 Minimum Voltage (volts): 20.0 Converter/Inverter Requirement (flag): Weight (kg): 4.7 (10.4 lb)  $2.8 \times 10^4$  (1.0 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 316 (110° F) Minimum (°K):  $255 (0^{\circ} F)$ Pressure (kg/m<sup>2</sup>):

DP (0201)

Subsystem:

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Low Rate Telemetry Analog Points (No.): 1 Digital Points (No.): 4 Sample Rate (sec<sup>-1</sup>): 0.0075 Word Length (bits): 8 Safety Failure Model (flag): 1 7 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 8,302 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 -Total Redundant Elements (No.): 2 Cost 210.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 97.0 Unit Production (\$1000): 35.0 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6. 2 Development Lead Time Variable (months): 2..7 · . Qualification Lead Time Constant (months): 1.8 Qualification Lead Time Variable (months): 0.2. State-of-Art Factor (N.D.): 1.0

Configurations: A11 Digital Telemetry Unit Equipment Type: Performance Technical Characteristics 128 kbps Bit rate: (1)8 bits (2) Word length: Number of main frame words: 128 (3) 4 Number of subframes: (4)Number of words per subframe: 128 (5) Digital multiplexer (yes/no): Yes (1) (6) (7)(8) (9) (10)Power 3.0 Average Power (watts): 3.0 Maximum Power (watts): Minimum Power (watts): 0 28.0 Nominal Voltage (volts): 33.0 Maximum Voltage (volts): 20.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 4.1 (9.0 lb) Weight (kg):  $2.5 \times 10^4 \ (0.9 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 316 (110°F) Maximum (<sup>o</sup>K):  $255 ( 0^{\circ} F)$ Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

DP (0202)

Subsystem:

### CDPI Power Switching Commands (No.); Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): 1 Sample Rate (sec 1): 125 Word Length (bits): 8 Low Rate Telemetry. Analog Points (No.): 4 Digital Points (No.): 1 Sample Rate (sec-1): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 18,302. Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.! Total Redundant Elements (No.): 2. Cost Design Engineering (\$1000): 500. ( Test and Evaluation (\$1000): 175. ( Unit Production (\$1000): 95.( Reference Quantity (No.): . 2. Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6. 2 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 1, 8 Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

DP (0301) Subsystem: A11 Configurations: Tape Recorder (AF/NE Univ.) Equipment Type: Performance Technical Characteristics  $6.5 \times 10^5$  bits Capacity: (1)122 m (400 ft) Equivalent length: (2)59.1 bits/cm (150 bits/in. Density: (3) 1 cm/sec (0.4 in./sec) Record rate: (4)18 cm/sec (7.2 in./sec) Reproduce rate: (5) (6) (7)(8) (9)(10)Power 3.0 Average Power (watts): 5.0 Maximum Power (watts): 0 ` Minimum Power (watts): Nominal Voltage (volts): 28.0 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 4.4 (9.6 lb) Weight (kg):  $5.89 \times 10^3$  (0.208 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>o</sup>K): 275 (35° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

CDPI	
Power Switching Commands (No.):	1 .
Time Tagged Commands (No.):	•
Other Commands (No.):	5
High Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
· · · Low Rate Telémetry	
Analog Points (No.):	2
Digital Points (No.):	6
Sample Rate (sec 1):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	, .
Failure Rate or Mean (x $10^{\pm 9}$ hr):	16,00
Standard Deviation (x $10^{+9}$ hr):	,
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	. 4
Cost	
Design Engineering (\$1000):	305.0
Test and Evaluation (\$1000):	252.0
Unit Production (\$1000):	265.0
Reference Quantity (No.):	2
Factor (N.D.):	1
Schedule	
Schedule  Development Lead Time Constant (months):	12.0
·	12.0
Development Lead Time Constant (months):	
Development Lead Time Constant (months): Development Lead Time Variable (months):	8.3

Configurations: All Equipment Type: Tape Recorder (CNES/D2B) Performance Technical Characteristics  $1.6 \times 10^6$  bits (1)Capacity: (2) Equivalent length: 152 m (500 ft) Density: (3) 133 bits/cm (338 bits/in.) (4)Record rate: 1.9 cm/sec (0.74 in./sec) 61.5 cm/sec (24.2 in./sec) (5) Reproduce rate: (6) (7) (8) (9) (10)Power Average Power (watts): 4.5 Maximum Power (watts): 7.0 Minimum Power (watts): 0 Nominal Voltage (volts): 28.0 Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 4.99 (11.0 ft) Weight (kg):  $6.48 \times 10^3$  (0.229 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 311 (100° F) Minimum (<sup>o</sup>K): 275 (35° F) Pressure (kg/m<sup>2</sup>):

DP (0302)

Subsystem:

### CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): 5 Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): $\cdot$ Sample, Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry . 2 Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 . 8 Word Length (bits): Safety Failure Model (flag): -1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) 1600 Standard Deviation (x 10<sup>+9</sup> hr): $\cdot .0.5$ Dormancy Factor (N.D.): .4 Total Redundant Elements (No.): Cost 334.0 Design Engineering (\$1000): 271.0 Test and Evaluation (\$1000): 285.0 Unit Production (\$1000): 2 Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): 12.0 8.3 Development Lead Time Variable (months): 8.0 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 1.6 1.0 State-of-Art Factor (N.D.):

DP (0303) Subsystem: Configurations: A11 Tape Recorder (NASA/ISS) Equipment Type: Performance Technical Characteristics  $\sim$  7.1 x 10<sup>6</sup> bits. Capacity: (1)142 m (360.ft) (2) Equivalent length: 4318 bits/cm. (1700 bits/in.) Density: (3)1.5 cm/sec (0.6 in./sec) Record rate: (4)39.6 cm/sec (15.6 in./sec) Reproduce rate: (5) (6) (7)(8) (9) (10)Power 4.0 Average Power (watts): 8.0 Maximum Power (watts): Minimum Power (watts): 0 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32.0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 4.99 (11.0 lb) Weight (kg):  $6.40 \times 10^3$  (0.226 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100°F) Maximum (<sup>o</sup>K): 275 (35°F) Minimum (<sup>o</sup>K):

CDPI	
Power Switching Commands (No.):	-1
Time Tagged Commands (No.):	,
Other Commands (No.):	5
High Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	6
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	
Failure Rate or Mean (x 10 <sup>-</sup> /hr):	1600
Standard Deviation (x 10 <sup>+9</sup> hr):	
Dormancy Factor (N.D.):	0,5
Total Redundant Elements (No.):	4
Cost	-
Design Engineering (\$1000):	34.0
Test and Evaluation (\$1000):	:71,.0
Unit Production (\$1000):	85.0
Reference Quantity (No.):	2
Factor (N.D.):	1.
Schedule	•
Development Lead Time Constant (months):	12.0
Development Lead Time Variable (months):	8.€
Qualification Lead Time Constant (months):	.8.0
Qualification Lead Time Variable (months):	1.6
State-of-Art Factor (N.D.):	1.(

```
DP (0304)
ubsystem:
onfigurations:
                      All
                      Tape Recorder (NASA/AE)
quipment Type:
erformance
  Technical Characteristics
                                       1.2 \times 10^8 bits
           Capacity:
     (1)
                                       336 m (1200 ft)
           Equivalent length:
     (2)
                                       1614 bits/cm (4100 bits/in.)
           Density:
     (3)
                                       10 cm/sec (4.0 in./sec)
           Record rate:
     (4)
                                       81 cm/sec (32 in./sec)
           Reproduce rate:
     (5)
     (6)
     (7)
     (8)
     (9)
   (10)
 Power
     Average Power (watts):
                                        6.5
    Maximum Power (watts):
                                       11.0
    Minimum Power (watts):
                                        0
                                       28.0
    Nominal Voltage (volts):
                                       32.0
    Maximum Voltage (volts):
                                       24.0
    Minimum Voltage (volts):
   . Converter/Inverter
       Requirement (flag):
                                       7.26 (16.0 lb)
 Weight (kg):
                                       1.23 \times 10^4 (0.434 ft<sup>3</sup>)
  Volume (cc):
  Vibration
     Random (g, rms):
    Non-Random (g):
  Temperature
    Maximum (<sup>O</sup>K):
                                       311 (100° F)
```

Pressure (kg/m<sup>2</sup>):

Minimum (°K):

275 (35°. F)

```
CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
      Other Commands (No.):
                                                     უ5. "
      High Rate-Telemetry
         Analog Points (No.):
      - Digital Points (No.):
    \cdot \cdot \cdot Sample Rate (sec<sup>-1</sup>):
     Word Length (bits):
      Low Rate Telemetry
                                                      2
         Analog Points (No.):
                                                      6
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                      1
                                                      8
         Word Length (bits):
Safety
   Failure Model (flag):
                                                      1
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup>, hr):
                                                  1600
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
   Total Redundant Elements (No.):
Cost
                                                   430.0
   Design Engineering ($1000):
   Test and Evaluation ($1000):
                                                   335.0
   Unit Production ($1000):
                                                   349.0
   Reference Quantity (No.):
                                                      2
                                                      1
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months):
                                                     12.0
                                                     8.3
   Development Lead Time Variable (months):
   Qualification Lead Time Constant (months):
                                                     8.0
                                                     1.6
   Qualification Lead Time Variable (months):
                                                      1.0
  State-of-Art Factor (N.D.):
```

DP (0305) Subsystem: A11.-Configurations: Tape Recorder (NASA/OSO Equipment Type: Performance Technical Characteristics  $8.5 \times 10^7$  bits Capacity: (1) 549 m (1800 ft) Equivalent length: (2)1575 bits/cm (4000 bits/in. Density: (3) Record rate: 4.1 cm/sec (1.6 in./sec) (4)81 cm/sec (32 in./sec) Reproduce rate: (5) (6) (7)(8)(9) (10)Power 4.0 Average Power (watts): Maximum Power (watts): 11.0 Minimum Power (watts): 0 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32.0-Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): 7.03 (15.5 lb) Weight (kg):  $1.02 \times 10^4 \ (0.359 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>o</sup>K): 275 (35° F) Minimum (<sup>o</sup>K):

### **CDPI** Power Switching Commands (No.): Ι, Time Tagged Commands (No.): 5., Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): · Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): 6 Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1600 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): . 0.5 Total Redundant Elements (No.): .. 4 Cost 420.0 Design Engineering (\$1000): 330,0 Test and Evaluation (\$1000): Unit Production (\$1000): 341.0 Reference Quantity (No.): 2 1 Factor (N.D.): Schedule 12.0 Development Lead Time Constant (months): Development Lead Time Variable (months): 8.3 Qualification Lead Time Constant (months): 8.0 1.6 Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

í.0

Subsystem: DP (0306) **A11** Configurations: Tape Recorder (NASA/NIMBUS-E) Equipment Type: . Performance Technical Characteristics  $2.1 \times 10^7$  bits (1) Capacity: 533 m (1750 ft) Equivalent length: (2) 1772 bits/cm (4500 bits/in. Density: (3) 107 cm/sec (42 in./sec) Record rate: (4)107 cm/sec (42 in./sec) Reproduce rate: (5) (6) (7) (8) (9) (10)Power 14.5 Average Power (watts): 15.5 Maximum Power (watts): Minimum Power (watts): 0 28.0 Nominal Voltage (volts): 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Convèrter/Inverter Requirement (flag): 9.30 (20.5 lb) Weight (kg):  $1.28 \times 10^4 \ (0.451 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>o</sup>K): 275  $(35^{\circ} F)$ Minimum (<sup>o</sup>K):

### CDPI Power Switching Commands (No.): ` 1 Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec-1): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.):. Digital Points (No.): 6 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1600 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 4 Total Redundant Elements (No.): Cost 508.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 385,0 Unit Production (\$1000): 400.0 Reference Quantity (No.): 2 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 12..Ó Development Lead Time Variable (months): .8.3 Qualification Lead Time Constant (months): 8:0 Qualification Lead Time Variable (months): 1.6 1 0 State-of-Art Factor (N.D.): 1 1

Subsystem: , DP (0307) Configurations: AII Tape Recorder (AF/SESP-70-1) Equipment Type: Performance Technical Characteristics  $2.3 \times 10^{9}$  bits Capacity: (1)Equivalent length: 594 m (1950 ft (2) 5591 bits/cm (14,200 bits/sec) Density: (3) Record rate: 23 cm/sec (9.0 in./sec) (4) 137 cm/sec (54 in./sec) Reproduce rate: (5) (6)(7) (8) (9) (10)Power 20.0 Average Power (watts): 30.0 Maximum Power (watts): Minimum Power (watts): 0 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32,0 Minimum Voltage (volts): 24.0 Converter/Inverter Requirement (flag): Weight (kg): 7.04 (15,5 lb)  $9.51 \times 10^3$  (0.336 ft<sup>3</sup> Volume (cc): Vibration . Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>o</sup>K): 275 (35° F) Minimum (<sup>o</sup>K):

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 5 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) 1600 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 4 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 420.0 Test and Evaluation (\$1000): 330,0 Unit Production (\$1000): 341.Ò Reference Quantity (No.): 2 Factor (N.D.):

## Schedule

pe 4	•
Development Lead Time Constant (months)	12.0
Development Lead Time Variable (months)	8.3
Qualification Lead Time Constant (months)	8.0
Qualification Lead Time Variable (months)	1.6
State-of-Art Factor (N'. D.):	1.0

DP (0308) Subsystem: Configurations: A11 Tape Recorder (AF/STP71-2 and 72-1). Equipment Type: Performance Technical Characteristics  $1.53 \times 10^9$  bits Capacity: (1) 625 m (2050 ft) . Equivalent length: (2) 3465 bits/cm (8800 bits/in.) Density: (3) 19 cm/sec (7.3 in./sec) Record rate: (4)150 cm/sec (59 in./sec) Reproduce rate: (5) (6) (7) (8) (9) (10)Power 15.0 Average Power (watts): 25.0 Maximum Power (watts): . 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 7.04 (15.5 lb) Weight (kg):  $9.51 \times 10^3$  (0.336 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>o</sup>K): 275 (35° F) Minimum (<sup>o</sup>K):

CDPI	
Power Switching Commands (No.):	1
Time Tagged Commands (No.):	* **;
Other Commands (No.):	5、
High Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
Low Rate Telemetry	•
Analog Points (No.):	2
Digital Points (No.):	6
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters.	
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	1600
Standard Deviation (x $10^{+9}$ hr):	
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	4
Cost	·.··
Design Engineering (\$1000):	420.0
Test and Evaluation (\$1000):	330.0
Unit Production (\$1000):	341.0
Reference Quantity (No.):	2
Factor (N.D.):	` 1
Schedule	
Development Lead Time Constant (months)	12.0
Development Lead Time Variable (months)	8.3
Qualification Lead Time Constant (months)	8.0
Qualification Lead Time Variable (months)	·i.6
State-of-Art Factor (N.D.):	1.0

DP (0309) Subsystem: Configurations: A11 Tape Recorder (AF/STP72-2) Equipment Type: Performance Technical Characteristics  $1.53 \times 10^{9}$  bits (1) Capacity: 549 m (1800 ft) (2) Equivalent length: 5591 bits/cm (14,200 bits/in. (3) Density: 5.72 cm/sec (2.25 in./sec) (4)Record rate: 180 cm/sec (72 in/sec) Reproduce rate: (5) (6) (7) (8)(9) (10)Power 14.0 Average Power (watts): Maximum Power (watts): 30.0 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 7.62 (16.8 lb) Weight (kg):  $1.06 \times 10^4 \ (0.376 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>o</sup>K): 275 (35° F) Minimum (<sup>0</sup>K):

# Performance (continued) CDPI Power Switching Commands (No.): <u>l</u>. . Time Tagged Commands (No.): 5 . Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sèc<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) 1600 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): Total Redundant Elements (No.): 4 Cost **£20.0** Design Engineering (\$1000): Test and Evaluation (\$1000): 345.0 Unit Production (\$1000): 357.0 2 Reference Quantity (No.): Factor (N.D.): Schedule 12,0 Development Lead Time Constant (months): 8.3 Development Lead Time Variable (months):

Qualification. Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

8.0

1.6

1,0

DP (0310) Subsystem: All Configurations: Tape Recorder (AF/S-3) Equipment Type: Performance Technical Characteristics  $2.0 \times 10^8$  bits Capacity: (1)294 m (966 ft) Equivalent length: (2) 3504 bits/cm (8900 bits/in.) Density: (3) 4.67 cm/sec (1.84 in./sec) Record rate: (4)37.3 cm/sec (14.7 in./sec) (5) Reproduce rate: (6) (7) (8) (9) (10)Power 7.0 Average Power (watts): 14.0 Maximum Power (watts): 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 6.58 (14.5 lb) Weight (kg):  $9.51 \times 10^3$  (0.336 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>O</sup>K):

Pressure (kg/m<sup>2</sup>):

Minimum (<sup>o</sup>K):

275 (.35° F)

# CDPI

Power Switching Commands (No.):	$\frac{1}{2}$
Time Tagged Commands (No.):	
Other Commands (No.):	5
High Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
Low Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	6
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	, .
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	1600
Standard Deviation (x 10 <sup>+9</sup> hr):	
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	4
Cost	
Design Engineering (\$1000):	401,0
Test and Evaluation (\$1000):	318.0
Unit Production (\$1000):	330.0
Reference Quantity (No.):	2.
Factor (N.D.):	1
Schedule	•
Development Lead Time Constant (months):	12.0
Development Lead Time Variable (months):	8.3
Qualification Lead Time Constant (months):	8.0
Qualification Lead Time Variable (months):	1.6
State-of-Art Factor (N.D.):	1.0

DP (0311) Subsystem: Configurations: A11 Tape Recorder (AF) Equipment Type: Performance Technical Characteristics  $1.7 \times 10^9$  bits Capacity: (1)640 m (2100 ft) Equivalent length: (2) 3622 bits/cm (9200 bits/in.) Density: (3)26.2 cm/sec (10.3 in./sec) Record rate: (4)105 cm/sec (41.2 in./sec) Reproduce rate: (5) (6) (7)(8) (9)(10)Power 8.0 Average Power (watts): 33.0 Maximum Power (watts): 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 10.4 (23.0 lb) Weight (kg):  $1.36 \times 10^4$  (0.480 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>o</sup>K): 275 (35° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

### CDPI 1 Power Switching Commands (No.): Time Tagged Commands (No.): 5 Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec 1): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1600-Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): 4 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 547.0 410.0 Test and Evaluation (\$1000): 420.0 Unit Production (\$1000): Reference Quantity (No.): 1 Factor (N.D.): Schedule -12.0Development Lead Time Constant (months): .8.3 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 8.0 1.6 Qualification Lead Time Variable (months): ... . 1.0 State-of-Art Factor (N.D.):

```
Dual Spin
Configurations:
                        Electrical Integration Assembly
Equipment Type:
                        (includes converter)
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
                                         17.1
      Average Power (watts):
                                         24,0
      Maximum Power (watts):
                                          9.0
      Minimum Power (watts):
                                         28.0
      Nominal Voltage (volts):
                                         32.0
      Maximum Voltage (volts):
                                         24.0
      Minimum Voltage (volts):
      Converter/Inverter
         Requirement (flag):
                                         9.07 (20.0 lb)
   Weight (kg):
                                         5.7 \times 10^4 (2.0 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Tempe rature
                                          311 (100° F)
      Maximum (<sup>o</sup>K):
                                          266 (20° F)
      Minimum (<sup>o</sup>K):
   Pressure (kg/m<sup>2</sup>):
```

CDPI (0401)

Subsystem:

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.) Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Low Rate Telemetry 5 Analog Points (No.): 6 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 0.0075 Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 6500 Standard Deviation (x 10<sup>+9</sup> hr): Ó.5 Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost 0.7.0 Design Engineering (\$1000): .09.0 Test and Evaluation (\$1000): .06.0 Unit Production (\$1000): Reference Quantity (No.): 1-Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 3.5 Development Lead Time Variable (months): 1.5 Qualification Lead Time Constant (months): 1.9 Qualification Lead Time Variable (months): 0.2 State-of-Art Factor (N.D.): 1.0

```
Subsystem:
Configurations:
                        Dual Spin
Equipment Type:
                        Switching Logic Assembly
                        (includes converter)
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
      151
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
                                          22.2
      Average Power (watts):
                                          30.0
      Maximum Power (watts):
                                          11.0
      Minimum Power (watts):
                                          28.0
      Nominal Voltage (volts):
                                          32.0
      Maximum Voltage (volts):
                                          24.0
      Minimum Voltage (volts):
      Converter/Inverter
         Requirement (flag):
                                          5.44 (12.0 lb)
   Weight (kg):
                                          3.4 \times 10^4 (1.2 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Tempe rature
                                          311 (100° F)
      Maximum (<sup>0</sup>K):
                                          266 (20° F)
      Minimum (<sup>o</sup>K):
   Pressure (kg/m<sup>2</sup>):
```

CDPI (0501)

## CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): 1 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Low Rate Telemetry 6 Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec 1): 0,0075 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 6500 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): (Included Test and Evaluation (\$1000): Unit Production (\$1000): with Reference Quantity (No.): 0401) Factor (N.D.): Schedule Development Lead Time Constant (months): 3.5 Development Lead Time Variable (months): 1,5 Qualification Lead Time Constant (months): -.9 Qualification Lead Time Variable (months): . 2 State-of-Art Factor (N.D.): .0

Performance (continued)

```
CDPI (0601)
Subsystem:
                        All except Dual Spin
Configurations:
Equipment Type:
                        Electrical Integration Assembly
                        (includes converter)
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
  Power
                                          4.0
      Average Power (watts):
                                          6.0
     Maximum Power (watts):
                                          2.0
     Minimum Power (watts):
                                         28.0
     Nominal Voltage (volts):
                                         32.0
     Maximum Voltage (volts):
                                         24.0
     Minimum Voltage (volts):
     Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                         8.71 (19.2 1b)
                                         5.4 \times 10^4 (1.9 ft<sup>3</sup>)
   Volume (cc):
   Vibration
     Random (g, rms):
     Non-Random (g):
   Temperature
                                         311 (100° F)
     Maximum (<sup>o</sup>K):
                                         266 (20° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

CDPI : · ·	
Power Switching Commands (No.):	ģ
Time Tagged Commands (No.):	
Other Commands (No.):	Ž <sup>2</sup>
High Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
Low Rate Telemetry	
Analog Points (No.):	38
Digital Points (No.):	15
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	4
Safety	
Failure Model (flag):	1
Failure Parameters	,
Failure Rate or Mean (x 10 <sup>±9</sup> hr)	<b>3500</b>
Standard Deviation (x $10^{+9}$ hr):	
Dormancy Factor (N.D.):	0,5
Total Redundant Elements (No.):	4
Cost	
Design Engineering (\$1000):	1963.0
Test and Evaluation (\$1000):	469.0
Unit Production (\$1000):	256.0
Reference Quantity (No.):	1
Factor (N.D.):	1
Schedule	ŕ
Development Lead Time Constant (months)	3.5.
Development Lead Time Variable (months)	1.5
Qualification Lead Time Constant (months)	1.9.
Qualification Lead Time Variable (months)	0.2
State-of-Art Factor (N.D.):	1.0

```
CDPI (0701)
Subsystem: .
                       Alleexcept Dual Spin
Configurations:
                        Auxiliary Integration Assembly
Equipment Type:
                        (includes converter)
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
                                          5.8
      Average Power (watts):
                                          7.5
      Maximum Power (watts):
                                          3.0
      Minimum Power (watts):
                                         28.0
      Nominal Voltage (volts):
      Maximum Voltage (volts):
                                         32.0
                                         24.0
      Minimum Voltage (volts):
      Converter/Inverter
        Requirement (flag):
                                         5.44 (12.0 lb)
   Weight (kg):
                                         3.62 \times 10^3 (0.128 ft<sup>3</sup>
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
                                         311 (100° F)
      Maximum (<sup>o</sup>K):
                                         266 (20° F)
      Minimum (<sup>o</sup>K):
   Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): · Other Commands (No.): High Rate Telemetry 10 Analog Points (No.): Digital Points (No.): Sample Rate (sec-1): 125 Word Length (bits): 8 Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 1 ... Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 6500 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): -Total Redundant Elements (No.): Cost (Included Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): .0601)Factor (N.D.): Schedule 3.5 Development Lead Time Constant (months): Development Lead Time Variable (months): 1.5 Qualification Lead Time Constant (months): 1:9 Qualification Lead Time Variable (months): 0.21.0 State-of-Art Factor (N.D.):

Subsystem: G		Comm (0101)		
Configurations:		All except Separate Uplink and Downlink		
Equipment	Type:	Baseband Assembly Unit		
Performance	ce			
Technica	al Charact	eristics		
(.1)	Compatib	ility:	SGLS (1)	
(2)			128 kbps	
(3)	Second da	ita rate stream (Kbps):	NA	
(4)	First subcarrier frequency*:		1.024 MHz	
(5)	Second su	bcarrier frequency (Mhz):	NA	
(6)	Transmit	ter requirement (T):	. NA	
(7)				
(8)				
(9)				
(10)				
Power				
Avera	age Power	(watts):	. 0.52	
Maxir	num Powe	r (watts):	0,.52	
Minin	num Powe	r (watts):	0 .	
Nomi	nal Voltage	e (volts):	28.0	
Maxir	num Volta	ge (volts):	32.0	
Minin	num Volta	ge (volts):	24.0	
	erter/Inve			
Rec	qui rement	(flag):	C31(0701)	
Weight (	kg):		0.39 (0.85 1ь)	
Volume	(cc):		280 (0.01 ft <sup>3</sup> )	
Vibratio	n.			
Rando	om (g, rm:	s):		
Non-I	Random (g)	:		
Tempera	ıture			
Maximum ( <sup>o</sup> K):			322 (120° F)	
Minin	num ( <sup>o</sup> K):		264 ( 15° F)	

`ž ·

<sup>\*</sup>Second rate or frequency is the lower of the two if two are provided.

# Performance (continued) **CDPI** 1 Power Switching Commands (No.): Time Tagged Commands (No.): 1 Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 1147 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): . Total Redundant Elements (No.): . 3 Cost Design Engineering (\$1000): 29.0 Test and Evaluation (\$1000): 9:0 16.0 Unit Production (\$1000): 2 Reference Quantity (No.): . 1 Factor (N.D.): Schedule 7.3 Development Lead Time Constant (months): Development Lead Time Variable (months): 3.1 Qualification Lead Time Constant (months): 1.8 Qualification Lead Time Variable (months): 0.2 State-of-Art Factor (N.D.):

1.0

Subsystem:	(	Comm (0102) .	
Configurati	onfigurations: All except Separate opinic and Lownlink		
Equipment	Туре:	Baseband Assembly Unit	
Performance	ce		
Technica	al Character	ristics	
(1)	Compatibil	lit <del>y</del> :	SGLS (1)
(2)	First data	rate stream*:	128 kbps
(3)	Second da	ta rate stream (Kbps):	NA
(4)	First subc	arrier frequency*:	1,024 MHz
(5)	Second sub	ocarrier frequency (Mhz):	NA
(6)	Transmitt	er requirement:	T01(0303)
(7)			•
(8)			
(9)			
(10)			
Power			
Aver	age Power (	watts):	(included in T01)
Maxi	mum Power	(watts):	
Minir	num Power	(watts):	
Nomi	nal Voltage	(volts):	
Maxi	mum Voltag	ge (volts):	
Minir	num Voltag	e (volts):	
	erter/Inver quirement (		
Weight (kg):		(included in T01)	
Volume (cc):		(included in T01)	
Vibratio	on		
Rand	om (g, rms	<b>):</b>	
Non-	Random (g)	;	
Temper	ature		0
Maximum ( <sup>o</sup> K):			333 (140° F)
Mini	mum ( <sup>o</sup> K):		255 ( 0° F)
Pressu	re (kg/m <sup>2</sup> ):		-

<sup>\*</sup>Second rate or frequency is the lower of the two if two are provided.
2-261

### **CDPI** 1 Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): ` 1 High Kate Telemetry Analog Points (No.): ' Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec-1): 1 8 Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 2000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): ... 0.5 Total Redundant Elements (No.): - 3 Cost Design Engineering (\$1000): 29.0 Test and Evaluation (\$1000): 9.0 Unit Production (\$1000): 16.0 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 7,3 Development Lead Time Variable (months): 3, 1 Qualification Lead Time Constant (months): 1.8 Qualification Lead Time Variable (months): 0.2

1,0

State-of-Art Factor (N.D.):

Configurations: All Equipment Type: Antenna Performance Technical Characteristics (1) Frequency, high band max.: 2300 MHz (2) Frequency, high band min.: 2200 MHz Frequency, low band max.: 1850 MHz (3) Frequency, low band min.: 1750 MHz (4)Type and equipment number: Biconical 21 (5) On-axis gain: 2 dB(6) (7) (8) (9) (10)Power NAAverage Power (watts): Maximum Power (watts): ΝA Minimum Power (watts): NA Nominal Voltage (volts): NA Maximum Voltage (volts): NAMinimum Voltage (volts): NA Converter/Inverter Requirement (flag): 2.5 (5.6 lb) Weight (kg):  $1.6 \times 10^5$  (5.6 ft<sup>3</sup> Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 373 (212° F) Minimum (<sup>o</sup>K): 218 (-67° F) Pressure (kg/m<sup>2</sup>):

Comm (0201)

Subsystem:

```
Performance (continued)
     CDPI
        Power Switching Commands (No.):
        Time Tagged Commands (No.):
        Other Commands (No.):
       High Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
          Sample Rate (sec 1):
          Word Length (bits):
       Low Rate Telemetry
         Analog Points (No.):
          Digital Points (No.):
          Sample Rate (sec-1):
          Word Length (bits):
Safety
    Failure Model (flag):
                                                     1
    Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                  100
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
                                                    1.0
   Total Redundant Elements (No.):
                                                    2
Cost .
   Design Engineering ($1000):
                                                  180.0
   Test and Evaluation ($1000):
                                                  153.0
   Unit Production ($1000):
                                                   32.0
   Reference Quantity (No.):
                                                    2
   Factor (N.D.):
                                                    1
Schedule
  Development Lead Time Constant (months):
                                                   0
 . Development Lead Time Variable (months):
                                                   0
  Qualification Lead Time Constant (months):
                                                   0
  Qualification Lead Time Variable (months):
                                                   0
  State-of-Art Factor (N.D.):
                                                   1.0.
```

All Configurations: Equipment Type: Antenna Perforn Technical Characteristics 2300 MHz Frequency, high band max.: 2200 MHz Frequency, high band min.: (2) Frequency, low band max. (Mhz): 'NA (3)Frequency, low band min. (Mhz): ·NA (4)Parabola 1 Type and equipment number: (5) 20 dB On-axis gain: (6) (7) (8)(9) (10)Power NA Average Power (watts): NAMaximum Power (watts): NAMinimum Power (watts): NANominal Voltage (volts):  $_{
m NA}$ Maximum Voltage (volts): AMMinimum Voltage (volts): Converter/Inverter Requirement (flag): 0.95 (2.1 lb) Weight (kg):  $5.9 \pm 10^4 \ (2.1 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 373 (212° F) Maximum (<sup>o</sup>K): 218 (-67° F) Minimum (<sup>O</sup>K):

Comm (0202)

Subsystem:

Pressure (kg/m<sup>2</sup>):

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec-1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 1: Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 40 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 1.0 .2 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 104.0 80.0 Test and Evaluation (\$1000): Unit Production (\$1000): 11.5 2 . Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): 0 Development Lead Time Variable (months): - 0 Qualification Lead Time Constant (months): 0 Qualification Lead Time Variable (months): State-of-Art Factor (N.D.):

Comm (0203) Subsystem: A11 Configurations: Antenna Equipment Type: Performance Technical Characteristics Frequency, high band max.: 2300 MHz (1) Frequency, high band min.: 2200 MHz (2) Frequency, low band max.: 1850 MHz (3) Frequency, low band min.: 1750 MHz (4)Type and equipment number: Omni 11 (5) On-axis gain: -9 dB (6) (7) (8) (9) (10)Power NA Average Power (watts): Maximum Power (watts) NAMinimum Power (watts) NA ·NA Nominal Voltage (volts): ·NA Maximum Voltage (volts NAMinimum Voltage (volts Converter/Inverter Requirement (flag): 0.45 (1.0 lb) Weight (kg):  $2.8 \times 10^4$  (1.0 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 373 (212° F) Maximum (<sup>o</sup>K): 218 (-67° F) Minimum (<sup>o</sup>K):

Pressure (kg/m<sup>2</sup>):

### Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 1. ` Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 100 Standard Deviation (x 10<sup>+9</sup> hr): . 1,0 Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost. 67.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 46.0 Unit Production (\$1000): 12.0 2 Reference Quantity (No.): Factor (N.D.): 1 Schedule Development Lead Time Constant (months): . 0 · Development Lead Time Variable (months): ,0 Qualification Lead Time Constant (months): .0 ල. Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

A11 Configurations: Antenna Equipment Type: Performance Technical Characteristics Frequency, high band max. (Mhz): (1)Frequency, high band min. (Mhz): (2) (Mhz): Frequency, low band max. (3) (Mhz); Frequency, low band min. (4) Monopole 51 Type and equipment number: (5) 2 dB On-axis gain: (6) (7) (8)(9) (10)Power NAAverage Power (watts): NAMaximum Power (watts): NA Minimum Power (watts): NΑ Nominal Voltage (volts): NA . Maximum Voltage (volts): ΝA Minimum Voltage (volts): Converter/Inverter Requirement (flag): 0.45 (1.0 lb) Weight (kg):  $2.8 \times 10^4$  (1.0 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 373 (212° F) Maximum (<sup>o</sup>K): 218 (-67° F) Minimum (<sup>o</sup>K):

Comm (0204)

Subsystem:

Pressure (kg/m<sup>2</sup>):

# Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points: (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):

### Cost

67.
· 46.
12.
·2
1

1

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2

100

### Schedule

Development Lead Time Constant (months):	0
Development Lead Time Variable (months):	. 0
Qualification Lead Time Constant (months):	. <b>Ö</b>
Qualification Lead Time Variable (months):	0
State-of-Art Factor (N. D.)	7-

```
Comm (0205)
Subsystem:
Configurations:
                       All
Equipment Type:
                       Antenna
Performance
   Technical Characteristics
      (1)
            Frequency, high band max. (Mhz):
            Frequency, high band min. (Mhz):
      (2)
            Frequency, low band max.
                                         (Mhz):
      (3)
            Frequency, low band min.
                                         (Mhz):
      (4)
                                                     Conical spiral 41
            Type and equipment number:
      (5)
                                                     -1 dB
      (6)
            On-axis gain:
      (7)
      (8)
      (9).
     (10)
   Power
                                                     NA
      Average Power (watts):
                                                     NΑ
      Maximum Power (watts):
                                                     NΑ
      Minimum Power (watts):
                                                     ΝA
      Nominal Voltage (volts):
                                                     NA
      Maximum Voltage (volts):
                                                     NA
      Minimum Voltage (volts):
      Converter/Inverter
        Requirement (flag):
                                                     0.45 (1.0 lb)
   Weight (kg):
                                                     2.8 \times 10^4 (1.0 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
                                                      373 (212° F
      Maximum (<sup>o</sup>K):
                                                     218 (-67° F
      Minimum (<sup>o</sup>K):
   Pressure (kg/m<sup>2</sup>):
```

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 100 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): 2 Total Redundant Elements (No.): . . . . Cost Design Engineering (\$1000): 67.0 46.0 Test and Evaluation (\$1000): 12.0 Unit Production (\$1000): 2. . . Reference Quantity (No.): Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 0 > . Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): 0 Qualification Lead Time Variable (months): State-of-Art Factor (N.D.): 1,0

```
Subsystem:
                       Comm (0206)
                       A11
Configurations:
Equipment Type:
                       Antenna
Performance
  Technical Characteristics
            Frequency, high band max. (Mhz):
      (1)
             Frequency, high band min. (Mhz):
      (2)
             Frequency, low band max. (Mhz):
      (3)
             Frequency, low band min. (Mhz):
      (4)
             Type and equipment number:
                                                     Helix 31
      (5)
                                                     10 dB
             On-axis gain:
      (6)
      (7)
      (8)
      (9) -
    (10)
  Power
                                                      NΑ
      Average Power (watts):
     Maximum Power (watts):
                                                     NA
     Minimum Power (watts):
                                                     NΑ
     Nominal Voltage (volts):
                                                      NA
     Maximum Voltage (volts):
                                                      ΝA
     Minimum Voltage (volts):
                                                      NA
      Converter/Inverter
        Requirement (flag):
                                                      0.45 (1.0 lb)
  Weight (kg):
                                                     2.8 \times 10^4 (1.0 ft<sup>3</sup>)
  Volume (cc):
   Vibration .
      Random (g, rms):
     Non-Random (g):
  Temperature
                                                      373 (212° F)
     Maximum (<sup>o</sup>K):
     Minimum (<sup>o</sup>K):
                                                     218 (-67° F)
```

Pressure (kg/m<sup>2</sup>):

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No:): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry · Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 100 Standard Deviation (x 10<sup>+9</sup> hr): 1.0 Dormancy Factor (N.D.): 2 Total Redundant Elements (No.): Cost 67.0 Design Engineering (\$1000): 46.0 Test and Evaluation (\$1000): -12.0Unit Production (\$1000): 2 Reference Quantity (No.): Factor (N.D.): 1 Schedule 0 Development Lead Time Constant (months): 0 Development Lead Time Variable (months): 0 Qualification Lead Time Constant (months): 0 Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

Subsystem:		Comm (0301)	
Configurati	ons:	A11	
Equipment	Type:	Transmitter	
Performanc	се	•	
Technica	al Charact	eristics	
(1)	Special r	equirement code (T ): · ·	N)
(2)	Compatib	ility:	SGLS (1)
(3)	Maximun	n frequency:	2300 MHz
(4)	Minimum	frequency:	.2200 MHz
(5)	Power ou	ıtput:	0.8 watts
(6)	Unified o	r nonunified*:	Unified (1)
(7)	First sub	carrier frequency:	1.024 MHz
(8)	Second s	ubcarrrier frequency (Mhz):	NA
(9)	Input dat	a rate (Mbps):	NA ·
(10)	Modulati	on type:	Phase (1)
Power			• •
Avera	age Power	(watts):	. 10.0
Maximum Power (watts):		er (watts):	15.0
Minimum Power (v		r (watts):	5.0
Nominal Voltage (volts):		e (volts):	28.0
Maxi	mum Volta	ige (volts):	32.0
Minir	num Volta	ge (volts):	24.0
	erter/Inve qui rement		C31 (701)
Weight (	kg):		0.839 (1.85 lb)
Volume (cc):			$5.4 \times 10^3 \ (0.19 \text{ ft}^2)$
Vibratio	n		
Random (g, rms):			
Non-	Random (g		
Temperature			
Maxi	mum ( <sup>o</sup> K):		322 (120° F)
Minir	num ( <sup>o</sup> K):		264 ( 15° F)
Pressure (kg/m <sup>2</sup> ):			

<sup>\*</sup>Nonunified requires (7) and (8) to be blank. Unified requires (9) to be blank.

### Performance (continued) CDPI Power Switching Commands (No.): 2 Time Tagged Commands (No.): 12 Other Commands (No.): High Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 8 Low Rate Telemetry . 6 Analog Points (No.): Digital Points (No.): 2 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety ľ Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 336 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0,5 Total Redundant Elements (No.): 3 Cost Design Engineering (\$1000): 50.0 Test and Evaluation (\$1000): 50.0 Unit Production (\$1000): 20:0 Reference Quantity (No.): 2 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 11.7 Development Lead Time Variable (months): 5.0

3.4

0.4

1.0

Qualification Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

Subsystem:		Comm	(0302)		
Configurati	ons:	A11			
Equipment	Type:	Transm	nitter		
Performano	ce				
Technica	al Characte	ristics			
(1)	Special re	quireme	ent code (T ):	NA	
(2)	Compatibi	lity:		SGLS (1)	
(3)	Maximum	frequen	cy:	2300 MHz	
(4)	Minimum	frequenc	ey:	2200 MHz	
(5)	Power out	put:		1.6 watts	
(6)	Unified or	nonunif	ied*:	Nonunified (0)	
(7)	First subc	arrier f	frequency (Mhz):	NA .	
(8)	Second sul	bcarrier	frequency (Mhz):	NA	
(9)	Input data	rate:		1,024 Mbps	
(10)	Modulation	ı type:		Phase (1)	
Power					
Average Power (watt				16.0	
Maximum Power		(watts):	<b>:</b>	24, 0	
Minimum Power		(watts):		8.0	
Nominal Voltage		(volts):		28.0	
Maxin	num Voltag	e (volts)	) <b>:</b>	32.0	
Minim	um Voltage	e (volts)	:	24,0	
	rter/Invert uirement (t			C31 (0701)	
Weight (k	rg):			0.95 (2.1 lb)	
Volume (	cc):			$5.9 \times 10^4 (0.21 \text{ ft}^3)$	)
Vibration	L				
- Rando	m (g, rms)	:			
Non-R	andom (g):				
Temperature					
Maxim	num ( <sup>o</sup> K):			311 (100°F)	
Minim	um ( <sup>o</sup> K):			275 (35°F)	
Pressure	(kg/m <sup>2</sup> ):			• .	

<sup>\*</sup>Nonunified requires (7) and (8) to be blank. Unified requires (9) to be blank.

### CDPI Power Switching Commands (No.): 2 .Time Tagged Commands (No.): Other Commands (No.): 12 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 8 Low Rate Telemetry 6 Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 3022 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): . 3 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 231.0 84.4 Test and Evaluation (\$1000): 30.7 Unit Production (\$1000): 2 Reference Quantity (No.): Factor (N.D.): 1 Schedule 11.7 Development Lead Time Constant (months): Development Lead Time Variable (months): 10.7 3.4 Qualification Lead Time Constant (months): 1. Ž Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

Subsystem: Comm (0303)

Configurations: All

Equipment Type: Transmitter

### Performance

### Technical Characteristics

(1)	Special requirement code:	T01 (0102)
(2)	Compatibility:	3GLS'(1)
(3)	Maximum frequency:	2300 MHz
(4)	Minimum frequency:	$2200~\mathrm{MHz}$
(5)	Power output:	2 watts
(6)	Unified or nonunified*:	Unified (1)
(7 <u>)</u>	First subcarrier frequency:	1.024 MHz
(8)	Second subcarrier frequency (Mhz):	NA .
(9)	Input data rate (Mbps):	NÀ .
(10)	Modulation type:	Phase (1)

### Power

Average Power (watts):	10.0
Maximum Power (watts):	15.0
Minimum Power (watts):	5.0
Nominal Voltage (volts):	28.0
Maximum Voltage (volts):	36.0
Minimum Voltage (volts):	24.0

### Converter/Inverter Requirement (flag):

Weight (kg):	1.1	(2.4 lb)
--------------	-----	----------

Volume (cc):	$1.2 \times 10^3$	$(0.042 \text{ ft}^3)$
--------------	-------------------	------------------------

### Vibration

Random (g, rms):

Non-Random (g):

### Temperature

Maximum ( <sup>o</sup> K):	333	(1	40 <sup>0</sup>	F)
Minimum ( <sup>o</sup> K):	255	(	0°	F)

## Pressure (kg/m<sup>2</sup>):

\*Nonunified requires (7) and (8) to be blank. Unified requires (9) to be blank.

### CDPI Power Switching Commands (No.): 2 Time Tagged Commands (No.): Other Commands (No.): 14 High Rate Telemetry Analog Points (No.): . ₃ Digital Points (No.): · Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): 8 Low Rate Telemetry ' Analog Points (No.): 6 Digital Points (No.): 2 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 : Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 14,000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): . 3 Cost Design Engineering (\$1000): 27.0 Test and Evaluation (\$1000): 33.0 Unit Production (\$1000): 25.0 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 11.7 Development Lead Time Variable (months): 2.1 Qualification Lead Time Constant (months): 3,4 Qualification Lead Time Variable (months): 0.1

Performance (continued)

1.0:

State-of-Art Factor (N.D.):

Subsystem:		Comm (0304)	
Configurati	ons:	A11	
Equipment	Type:	Transmitter	
Performan	ce		
Technic	al Charact	eristics	
(1)	Special r	equirement code (T ):	NA
(2)	Compatib	oility:	USB (2)
(3)	Maximun	n frequency (Mhz):	
(4)	Minimum	n frequency (Mhz):	
(5)	Power ou	ıtput:	5 watts
(6)	Unified o	r nonunified*:	Nonunified (0)
(7)	. First sub	ocarrier frequency (Mhz):	. NA
(8)	Second su	ubcarrier frequency (Mhz):	NA .
(9)	Input data	a rate:	0.308 Mbps
(10)	Modulatio	on type:	Frequency (2)
Pòwer			
Aver	age Power	(watts):	.60.0
Maxi	mum Powe	er (watts):	90.0
Minir	num Powe	r (watts):	30.0
Nomi	nal Voltag	e (volts):	28.0
Maxi	mum Volta	age (volts):	32.0
Minir	num Volta	ge (volts):	24.0
	erter/Inve qui rement		
Weight (	kg):		0.4 (0.9 lb)
Volume	(cc):		230 (0.0081 ft <sup>3</sup> )
Vibratio	n		
Rand	om (g, rm	s):	
Non-	Random (g	):	
Tempera	ature		
Maximum ( <sup>o</sup> K):			322 (120° F)
Minir	num ( <sup>o</sup> K):		261 ( 10° F)
Pressur	e (kg/m <sup>2</sup> ):	:	

<sup>\*</sup>Nonunified requires (7) and (8) to be blank. Unified requires (9) to be blank.

CDPI	
Power Switching Commands (No.):	. 2
Time Tagged Commands (No.):	
Other Commands (No.):	12
High Rate Telemetry	
Analog Points (No.):	3
Digital Points (No.):	,
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits)::	8.
Low Rate Telemetry	
Analog Points (No.):	6.
Digital Points (No.):	2
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	7
Failure Modek (flag):	1
Failure Parameters	
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	14,000
Standard Deviation (x 10 <sup>+9</sup> hr)	
Dormancy Factor (N.D.):	0,5
Total Redundant Elements (No.):	, 3·
Cost	
Design Engineering (\$1000):	90.
Test and Evaluation (\$1000):	175.0°
Unit Production (\$1000):	31.0
Reference Quantity (No.):	4
Factor (N.D.):	1
Schedule	•
Development Lead Time Constant (months):	11.7
Development Lead Time Variable (months):	9.6
Qualification Lead Time Constant (months):	. 3,4
Qualification Lead Time Variable (months):	1.0
State-of-Art Factor (N.D.):	1.0

Subsystem	:	Comm (0305)	
Configurati	ions:	All	
Equipment	Type:	Transmitter	
Performan	ce		
Technic	al Characte		
(1)	Special re	equirement code (T ):	NA .
(2)	Compatib		SGLS (1)
(3)	Maximum	frequency:	2300 MHz
(4)	Minimum	frequency:	2200 MHz
(5)	Power out	tput:	10 watts
(6)	Unified or	non-unified*:	Unified (1)
(7)	First sub	carrier frequency	1.024 MHz
(8)	Second su	bcarrier frequency (Mhz):	NA ·
(9)	Input data	rate (Mbps):	ŊA
(10)	Modulatio	n type:	Phase (1)
Power			
Avera	age Power	(watts):	40.0
Maxii	num Power	r (watts):	50.0
Minimum Power (watts):			20.0
Nomi	nal Voltage	(volts):	28.0
Maxir	num Voltag	ge (volts):	32.0
Minin	num Voltag	ge (volts):	24.0
	erțer/Inver quirement (		
Weight (	kg):		1.1 (2.5 lb)
Volume	(cc):		570 (0.020 ft <sup>3</sup> )
Vibratio	n		
Rando	om (g, rms	):	
Non-I	Random (g):	:	, .
Tempera	iture	•	
Maximum ( <sup>o</sup> K):			322 (120° F)
Minin	num ( <sup>o</sup> K):		264 ( 15° F)
Pressure	e (kg/m <sup>2</sup> ):		• •

<sup>\*</sup>Nonunified requires (7) and (8) to be blank. Unified requires (9) to be blank.

CDPI .	
Power Switching Commands (No.):	2
Time Tagged Commands (No.):	
Other Commands (No.):	12
High Rate Telemetry	
Analog Points (No.):	3
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits):	8
Low Rate Telemetry	•
Analog Points (No.):	6
Digital Points (No.):	2
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	. 8
Safety	
Failure Model (flag):	1
Failure Parameters	
I direct I di miletero	
	14,000
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr):	14,000
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	14,000 0,5
Failure Rate or Mean (x $10^{\pm 9}$ hr): Standard Deviation (x $10^{\pm 9}$ hr):	·
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.):	0,5
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):	0,5
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost	<b>0.</b> 5
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000):	0.5 3
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000):	0.5 3 100.0 100.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000):	0.5 3 100.0 100.0 25.0
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.):	0.5 3 100.0 100.0 25.0 2
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule	0.5 3 100.0 100.0 25.0 2
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months):	0.5 3 100.0 100.0 25.0 2 1
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months): Development Lead Time Variable (months):	0.5 3 100.0 100.0 25.0 2 1
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost  Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule  Development Lead Time Constant (months): Development Lead Time Variable (months): Qualification Lead Time Constant (months):	0.5 3 100.0 100.0 25.0 2 1
Failure Rate or Mean (x 10 <sup>±9</sup> hr): Standard Deviation (x 10 <sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.):  Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):  Schedule Development Lead Time Constant (months): Development Lead Time Variable (months):	0.5 3 100.0 100.0 25.0 2 1

Subsystem:		Comm	(0306)		
Configurations:		All			
Equipment Type:		Transn	nitter		
Performan	ce				
Technica	al Characte	eristics			
(1)	Special requirement code (T):		NA		
(2)	Compatibility:			SGLS (1)	
(3)	Maximum frequency:		2300 MHz		
(4)	Minimum frequency:		2200	MHz	
(5)	Power output:		20 watts		
(6)	Unified o	r nonuni	fied*:	Unified (1)	
(7)	First sub	carrier	frequency:	1.024 MHz	
(8)	Second su	bcarrie	r frequency (Mhz):	NA	
(9) ·	Input data	rate (M	Ibps):	NA	
(10)	Modulatio	n type:		Phas	se (I)
Power					
Avera	age Power	(watts):		90.0	•
Maximum Powe		r (watts)	):	110.0	
Minimum Power		r (watts)	:	50.0	
Nominal Voltage (volts):		:	28.0		
Maximum Voltage (volt		ge (volts	s):	32.0	
Minir	num Voltaș	ge (volts	):	24.0	
	erter/Inver quirement				
Weight (	kg):			1.25	(2,75 lb)
Volume	(cc):			570	(0.020 ft <sup>3</sup> )
Vibratio	n				
Rando	om (g, rms	s):			
Non-	Random (g)	:			
Tempera	ature	•			
Maximum (°K):					(120° F)
Minimum ( <sup>o</sup> K):				. 264	( .15° F)
Pressur	e (kg/m <sup>2</sup> ):				

<sup>\*</sup>Nonunified requires (7) and (8) to be blank. Unified requires (9) to be blank.

### CDPI Power Switching Commands (No.): 2 Time Tagged Commands (No.): Other Commands (No.): 12 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 Word Length (bits): - 8 Low Rate Telemetry 6 Analog Points (No.): 2 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 14,000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 3 Cost Design Engineering (\$1000): 110.0 Test and Evaluation (\$1000): 110.0 Unit Production (\$1000): 27.5 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule , Development Lead Time Constant (months): 11.7 Development Lead Time Variable (months): 8,5 Qualification Lead Time Constant (months): 3.4 Qualification Lead Time Variable (months): 0.8 State-of-Art Factor (N.D.): 1.0

Subsystem	:	Comm- (0307)		
Configurati	ons:	All		
Equipment	Type:	Transmitter .		
Performan	ce			
Technic	al Charact	eristics		
(1)	Special r	equirement code (T ):	NA	
(2)	Compatib	oility:	SGLS (1)	
(3)	Maximum	n frequency:	2300 MHz	
(4)	Minimum	frequency:	<sup>2</sup> 2200 MHz	
(5)	Power ou	itput;	5 watts	
(6)	Unified o	r nonunified*:	Unified (1)	
(7)	First sub	ocarrier frequency:	1,024 MHz	
(8)	Second su	ubcarrier frequency (Mhz):	NA	
(9)	Input data	a rate (Mbps):	. NA	
(10)	Modulatio	on type:	Phase (1)	
Power				
Aver	age Power	(watts):	20.0	
Maximum Power (watts):		er (watts):	26.0	
Mini	mum Powe	r (watts):	10.0	
Nominal Voltage (volts):		28.0		
Maximum Voltage (volts):		age (volts):	32.0	
Minimum Voltage (volts):		24.0		
	erter/Inve qui rement			
Weight	(kg):		1.02 (2.25 lb)	
Volume	(cc):		570 (0.020 ft <sup>3</sup> )	
Vibratio	on			
Rand	lom (g, rm	ıs):		
Non-	Random (g	g):		
Temper	ature	•		
Maximum ( <sup>0</sup> K):		•	322 (120° F)	
Mini	mum ( <sup>o</sup> K):		264 ( 15° F)	
	_			

<sup>\*</sup>Nonunified requires (7) and (8) to be blank. Unified requires (9) to be blank.

Pressure (kg/m<sup>2</sup>):

# CDPI

Cost

State-of-Art Factor (N.D.):

1.0

Configurations: A11Equipment Type: Receiver Performance Technical Characteristics Compatibility, range and range rate: SGLS (1) 1850 MHz Maximum frequency: (2)1750 MHz Minimum frequency: (3) Phase (1) Modulation type: (4)Maximum command rate (baud or bps): 1000 (5) Ternary FSK (3) Command output type (6) 65 kHz (7) , F<sub>1</sub>: 76 kHz (8)F2: 95, kHz (9) F3: Signal conditioner requirement (10)NA(SC \_ \_ ): Power Average Power (watts): 3.0 4,0 . Maximum Power (watts): 1.0 Minimum Power (watts): 28.0 Nominal Voltage (volts): Maximum Voltage (volts): 32,0 24.0 Minimum Voltage (volts): Converter/Inverter . C30 (702) Requirement (flag): 1.8 (4.0 lb) Weight (kg):  $1.1 \times 10^4 \ (0.4 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 322 (120° F) Maximum (<sup>o</sup>K): 264 (15° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

Comm (0401)

Subsystem:

CDPI	7 2
Power Switching Commands (No.):	·2
Time Tagged Commands (No.):	• •
Other Commands (No.):	. 2
High Rate Telemetry	•
Analog Points (No.):	2
Digital Points (No.):	7 ^
Sample Rate (sec <sup>-1</sup> ):	125
Word Length (bits):	8.
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	1 .
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	•
Failure Rate or Mean (x 10 <sup>±9</sup> hr):	4206
Standard Deviation (x 10 <sup>+9</sup> hr):	
Dormancy Factor (N3D.):	0.5
	0.5
Total Redundant Elements (No.):	. 3
Total Redundant Elements (No.):  Cost	_
Cost	_
	3
Cost Design Engineering (\$1000):	76.0
Cost Design Engineering (\$1000): Test and Evaluation (\$1000):	76.0 71.0
Cost Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000):	76.0 71.0 35.0
Cost  Design Engineering (\$1000):  Test and Evaluation (\$1000):  Unit Production (\$1000):  Reference Quantity (No.):	76.0 71.0 35.0 2
Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule	76.0 71.0 35.0 2
Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.):	76.0 71.0 35.0 2
Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): Development Lead Time Variable (months):	76.0 71.0 35.0 2 1
Design Engineering (\$1000): Test and Evaluation (\$1000): Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months):	76.0 71.0 35.0 2 1

All Configurations: Equipment Type: Receiver Performance Technical Characteristics (1)Compatibility, range and range rate: SGLS (1) (2) Maximum frequency: 1850 MHz (3) Minimum frequency: 1750 MHz (4)Modulation type: Phase (1) (5) Maximum command rate (baud or bps): 1000 Command output type: (6) Ternary FSK (3) F1: (7) 65 kHz . (8) F<sub>2</sub>: 76 kHz (9) F3: "95 kHz (10)Signal conditioner requirement: SC01 (0501) Power Average Power (watts): 3.25 Maximum Power (watts) 5.0° Minimum Power (watts): 1.1 Nominal Voltage (volts): 28. Ò Maximum Voltage (volts) 36.0 Minimum Voltage (volts) 24.0 Converter/Inverter Requirement (flag): Weight (kg): 1.6 (3.6 16)  $1.2 \times 10^3$  (0.042 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 333 (140° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

Comm (0402)

Subsystem:

### CDPI . 1 Power Switching Commands (No.): Time Tagged Commands (No.): 2 Other Commands (No.): High Rate Telemetry 2 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 125 .8 Word Length (bits): Low Rate Telemetry 2 Analog Points (No.): Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 3000 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): 3 . Total Redundant Elements (No.): Cost 72.0 Design Engineering (\$1000): 160.0 Test and Evaluation (\$1000): 34.0 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule 4.2 Development Lead Time Constant (months): 3.8 Development Lead Time Variable (months): 7.1 Qualification Lead Time Constant (months): 2.5 Qualification Lead Time Variable (months): 1.0 State-of-Art Factor (N.D.):

Performance (continued).

All Configurations: Command Signal Conditioner Equipment Type: Performance Technical Characteristics SGLS (1) (1) Compatibility: Special requirement code: SC01 (0402) (2) Command input: Ternary FSK (3) (3) (4)F1: 65 kHz 76 kHz (5) F<sub>2</sub>: 95 kHz (6)F3: 1000 baud Maximum command rate: **(:7)** .1 (8) (9) (10)Power (included in receiver) Average Power (watts): Maximum Power (watts): Minimum Power (watts): Nominal Voltage (volts): Maximum Voltage' (volts) Minimum Voltage (volts) Converter/Inverter Requirement (flag): (included in receiver) Weight (kg): Volume (cc): (included in receiver) Vibration Random (g, rms): Non-Random (g): Temperature 333 (140° F) Maximum (<sup>O</sup>K):  $255 \cdot (0^{\circ} F)$ Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

Comm (0501)

Subsystem:

### Performance (continued) CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): 2 Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): . Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 3000 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 3 Total Redundant Elements (No.): Cost 36.0 Design Engineering (\$1000): 27.0 Test and Evaluation (\$1000): 25.0 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule 7.3 Development Lead Time Constant (months): 3,1

Development Lead Time Variable (months):

Qualification Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

1.8

0.2

1.0

Configurations: Command Signal Conditioner Equipment Type: Performance Technical Characteristics SGLS (1) Compatibility: (1)Special requirement code (SC \_ \_ ): NA (2) Command input: Ternary FSK (3) (3) F1: 65 kHz (4)76 kHz F<sub>2</sub>: (5) 95 kHz (6) F3: 1000 baud Maximum command rate: (7)(8) (9) (10)Power Average Power (watts): 1.0 Maximum Power (watts): 1.0 0.5 Minimum Power (watts): 28.0 Nominal Voltage (volts): 32.-0 Maximum Voltage (volts): Minimum Voltage (volts): 24.0 Converter/Inverter C30 (0702) Requirement (flag): 0.612 (1.35 lb) Weight (kg):  $4.0 \times 10^3$  (0.14 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>0</sup>K): 322 (120° F) 264 ( 15° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

Comm (0502)

A11

Subsystem:

### Performance (continued) CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): 2. Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): 1 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 2296 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): 3 Total Redundant Elements (No.): Cost 36.0 Design Engineering (\$1000): 27.0 Test and Evaluation (\$1000): 25.0 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule 7.3 Development Lead Time Constant (months): 3.1 Development Lead Time Variable (months): 1.8 Qualification Lead Time Constant (months): 0.2 Qualification Lead Time Variable (months): 1,0 State-of-Art Factor (N.D.):

Subsystem: Comm (0601) Configurations Having Common Antenna Configurations: Equipment Type: Diplexer Performance Technical Characteristics SGLS (1) Compatibility: (1)1850 MHz (2) Max. receive frequency: 1750 MHz Min. receive frequency: (3)2300 MHz Max. transmit frequency: (4)2200 MHz Min. transmit frequency: (5) 7 watts Max. allowable transmit power: (6) -(7)(8)(9) (10)Power 1.0 Average Power (watts): 1.0 Maximum Power (watts): 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): · 32.0 Maximum Voltage (volts) 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 0.34 (0.75 lb) Weight (kg): 510 (0.018 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature

Pressure (kg/m<sup>2</sup>):

Maximum (<sup>o</sup>K):

Minimum (<sup>O</sup>K):

344 (160° F)

 $239 (-30^{\circ} F)$ 

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 1 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 1 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 130 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): 2 Total Redundant Elements (No.): Cost 10.0 Design Engineering (\$1000): 6.0 Test and Evaluation (\$1000): 7.0 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule 4.2 Development Lead Time Constant (months): Development Lead Time Variable (months): 1.6 0.9 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0.1

State-of-Art Factor (N.D.):

1.0

Comm (0602) Subsystem: Configurations Having Common Antenna Configurations: Equipment Type: Diplexer Performance Technical Characteristics SGLS (1) Compatibility: (1)(2) Max. receive frequency: 1850 MHz Min. receive frequency: 1750 MHz (3)2300 MHz Max. transmit frequency: (4)Min. transmit frequency: 2200 MHz (5) 20 watts Max. allowable transmit power: (6) (7)(8)(9) (10)Power 1.0 Average Power (watts): 1.0 Maximum Power (watts): 0 Minimum Power (watts): 28.0 Nominal Voltage (volts): 32.0 Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 0.82 (1.8 1b)Weight (kg): 990 (0.035 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (°K): 344 (160° F) 239 (-30° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

## Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 1 Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 130 Standard Deviation (x 10<sup>+9</sup> hr): 0.5 Dormancy Factor (N.D.): 2 Total Redundant Elements (No.): Cost 14.2 Design Engineering (\$1000): 10.0 · Test and Evaluation (\$1000): 11.2 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule 4.2 Development Lead Time Constant (months): 2,0 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 0.9 Qualification Lead Time Variable (months): 0.1 1,0 State-of-Art Factor (N.D.):

```
Comm (0701)
Subsystem:
Configurations:
                       Power Converter (Transmitter)
Equipment Type:
Performance
   Technical Characteristics
                                                      C31 (0701)
            Special requirement code:
      (1)
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
  Power
                                                       13.5
      Average Power (watts):
                                                       20,0
     Maximum Power (watts
                                                       10.0
     Minimum Power (watts
                                                       28.0___
     Nominal Voltage (volts)
                                                       32.0
     Maximum Voltage (volt
                                                       24.0
     Minimum Voltage (volts
     Converter/Inverter
        Requirement (flag):
                                                       0.794 (1.75 lb)
  Weight (kg):
                                                       5.1 \times 10^3 (0.18 ft<sup>3</sup>)
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Tempe rature
                                                       322 (120° F)
     Maximum (<sup>o</sup>K):
                                                       264 ( 15° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI 1 Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 1 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 872 Standard Deviation (x 10<sup>+9</sup> hr): ~ 0.5 Dormancy Factor (N.D.): 3 Total Redundant Elements (No.): Cost Design Engineering (\$1000): Test and Evaluation (\$1000): CER Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule 7.4 Development Lead Time Constant (months): 3.2 Development Lead Time Variable (months):

2.50.3

1,0

Qualification Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

Comm (0702) Subsystem: Configurations: Power Converter (Receiver) Equipment Type: Performance Technical Characteristics Special requirement code: C30 (0702) (2) (3) (4)(5) (6)(7) (8) (9) (10)Power Average Power (watts): 7.63 Maximum Power (watts): Minimum Power (watts): 28.0 Nominal Voltage (volts): 32. Ö Maximum Voltage (volts): 24.0 Minimum Voltage (volts): Converter/Inverter Requirement (flag): 0.794 (1.75 lb) Weight (kg):  $5.1 \times 10^3 \ (0.18 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature Maximum (<sup>o</sup>K): 322 (120° F) Minimum (<sup>o</sup>K): 264 ( 15° F)

Pressure (kg/m<sup>2</sup>):

# Performance (continued) CDPI Power Switching Commands (No.): 1 Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry 1 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 1 Failure Model (flag): · Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 882 • Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 3 Cost Design Engineering (\$1000): Test and Evaluation (\$1000): CER Unit Production (\$1000): Reference Quantity (No.): Factor (N.D.): Schedule

. 7.4 Development Lead Time Constant (months): Development Lead Time Variable (months): 3.2 Qualification Lead Time Constant (months): 2.5 Qualification Lead Time Variable (months): 0.3 1.0 State-of-Art Factor (N.D.):

Subsystem: EP (0101)

Configurations: Shunt & Shunt and Discharge Regulation

Equipment Type: Shunt Regulator

Performance

#### Technical Characteristics

- (1) Maximum power capacity: 62.6 watt
- (2)
- (3)
- (4)
- (5)
- (6)
- (7)
- (8)
- (9)
- (10)

#### Power

Average Power (watts):

Maximum Power (watts):

NA

Minimum Power (watts):

NA

Nominal Voltage (volts):

NA

Maximum Voltage (volts):

NA

Minimum Voltage (volts):

NA

Converter/Inverter Requirement (flag):

Weight (kg): 1.9 (4.2 lb)

Volume (cc):  $2.8 \times 10^4$  (1.0 ft<sup>2</sup>)

Vibration

Random (g, rms):

Non-Random (g):

Temperature

Maximum (<sup>o</sup>K): 373 (212<sup>o</sup> F)
Minimum (<sup>o</sup>K): 218 (-67<sup>o</sup> F)

Pressure (kg/m<sup>2</sup>):

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 1 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec 1): 1 Word Length (bits): 8 3afety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 200 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000): 80.0 Test and Evaluation (\$1000): 40.0 Unit Production (\$1000): 7.0 Reference Quantity (No.): 4 Factor (N.D.): chedule Development Lead Time Constant (months): 9.5 Development Lead Time Variable (months): 7.4 Qualification Lead Time Constant (months): 2.3 Qualification Lead Time Variable (months): 0.6 State-of-Art Factor (N.D.):

1.0

EP (0102) Subsystem: Configurations: Shunt & Shunt and Discharge Regulation Equipment Type: Shunt Regulator Performance · Technical Characteristics Maximum power capacity: 62.0 watts (2) (3) (4)(5) (6)(7)(8) **(9)** (10)Power Average Power (watts): NA · Maximum Power (watts): NAMinimum Power (watts): NANominal Voltage (volts): NA: Maximum Voltage (volts): NA Minimum Voltage (volts): NAConverter/Inverter Requirement (flag): 2.0 (4.4 lb) Weight (kg):  $1.2 \times 10^4 (0.44 \text{ ft}^3)$ Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 373 (212° F) Maximum (<sup>o</sup>K): Minimum (<sup>0</sup>,K): 218 (-67° F)

Pressure (kg/m<sup>2</sup>):

### Performance (continued) CDPI Power Switching Commands (No. Time Tagged Commands (No.): Other Commands (No.): 1 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec 1): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters .Failure Rate or Mean (x 10<sup>±9</sup> hr): .00 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): 80.0 Test and Evaluation (\$1000): 40.0 Unit Production (\$1000): 7.0 Reference Quantity (No.): 4 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 9.5 Development Lead Time Variable (months): 3.6 Qualification Lead Time Constant (months): 2.3 Qualification Lead Time Variable (months): 0.2 State-of-Art Factor (N.D.): 1.0

```
EP (0201)
Subsystem:
Configurations:
                    All
Equipment Type:
                    Battery cell
Performance
   Technical Characteristics
                                                     3.0 amp-hr
      (1)
             Capacity:
      (2)
             Watt/hour charge efficiency (N.D.):
                                                     0.65
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                                     NA
     Maximum Power (watts):
                                                     NΑ
     Minimum Power (watts):
                                                     NA
     Nominal Voltage (volts):
                                                     NΑ
     Maximum Voltage (volts):
                                                     NΑ
     Minimum Voltage (volts):
                                                     NA
      Converter/Inverter
        Requirement (flag):
                                                     0.14 (0.30 lb)
   Weight (kg):
                                                     66.3 (0.00234 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
     Non-Random (g):
   Temperature
                                                     300 (80.6°F)
     Maximum (<sup>0</sup>K):
                                                     277 (39, 2° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec 1): 1 Word Length (bits): 8 Safety Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x·10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): 6 Cost Design Engineering (\$1000): 51.0 Test and Evaluation (\$1000): 59.0 Unit Production (\$1000): 24.5 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 1.0 Qualification Lead Time Constant (months): 2. 1 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

```
EP (0202)
Subsystem:
                    A11
Configurations:
Equipment Type:
                    Battery cell
Performance
   Technical Characteristics
                                                    4.0 amp-hr
      (1)
             Capacity:
      (2)
             Watt/hour charge efficiency (N.D.):
                                                    0.65
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
     (9)
    (10)
  Power
     Average Power (watts):
                                                    NA
     Maximum Power (watts):
                                                    NA
     Minimum Power (watts):
                                                    NA
     Nominal Voltage (volts):
                                                    NA
                                                    NΑ
     Maximum Voltage (volts):
     Minimum Voltage (volts):
                                                    NA
     Converter/Inverter
        Requirement (flag):
                                                    0.15 (0.34 lb)
   Weight (kg):
                                                    68.8 (0.00243 ft<sup>3</sup>)
   Volume (cc):
   Vibration
     Random (g, rms):
     Non-Random (g):
   Temperature
    Maximum (OK):
                                                    300 (80.6°F)
     Minimum (<sup>o</sup>K):
                                                    277 (39.2°F)
  Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (N Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): · Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 8 Word Length (bits): Safety Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): ΝA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 6 . Total Redundant Elements (No.): Cost 55.0 Design Engineering (\$1000): 62.0. Test and Evaluation (\$1000): 26.0 Unit.Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 1.1 Qualification Lead Time Constant (months): 2. 1 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

```
Subsystem:
                  EP (0203)
Configurations:
                  A11
                  Battery cell
Equipment Type:
Performance
   Technical Characterist
     (1)
           Capacity:
                                   6.5 amp-hr
     (2)
           Watt/hour charge efficiency (N.D.'): '0.65
     (3)
     (4)
     (5)
     (6)
     (7)
     (8)
     (9)
    (10)
  Power
     Average Power (watts):
                                                 ΝA
    Maximum Power (watts):
                                                 NΆ
    Minimum Power (watts):
                                                 NA
    Nominal Voltage (volts):
                                                ·NA ·
    Maximum Voltage (volts):
                                                NA
    Minimum Voltage (volts):
                                                 NA
    Converter/Inverter
       Requirement (flag):
  Weight (kg):
                                                0.27 (0.60 1Ъ)
  Volume (cc):
                                                110 (0.0040 ft<sup>3</sup>)
  Vibration
    Random (g, rms)
    Non-Random (g):
 Temperature
    Maximum (<sup>o</sup>K):
                                                 300 (80.6° F)
    Minimum (<sup>o</sup>K):
                                                (277 (39. 2°F)
```

Pressure (kg/m<sup>2</sup>):

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry - Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 3 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): 6 Cost Design Engineering (\$1000): 64.0 Test and Evaluation (\$1000): 82.0 Unit Production (\$1000): 32.5 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 1.4 Qualification Lead Time Constant (months): 2.1 Qualification Lead Time Variable (months): 0.1

1.0

State-of-Art Factor (N.D.):

```
Configurations:
                  A11
Equipment Type: Battery cell
Performance
   Technical Characteristics
      (1)
          Capacity:
                                                  7.0 amp-hr
      (2)
          Watt/hour charge efficiency (N.D.): 0.65
      (3)
      (4)
      (5)
     (6)
     (7)
      (8)
     (9)
    (10)
  Power
     Average Power (watts):
                                                  ŇΑ
     Maximum Power (watts):
                                                  NA
     Minimum Power (watts):
                                                  NA
     Nominal Voltage (volts):
                                                  NΆ
     Maximum Voltage (volts)
                                                  NA
     Minimum Voltage (volts):
                                                  NA
     Converter/Inverter
        Requirement (flag):
                                                 0.28 (0.62 16)
  Weight (kg):
                                                  105 (0.00372 ft<sup>3</sup>)
   Volume (cc):
   Vibration
     Random (g, rms):
     Non-Random (g):
   Temperature
                                                  300 (80.6°F)
     Maximum (<sup>O</sup>K):
                                                  277 (39.2° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>);
```

Subsystem:

EP (0204)

# Performance (continued) CDPI Power Switching Commands (No.) Time Tagged Commands (No.): -Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec 1): Word Length (bits): Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): 6 . Cost Design Engineering (\$1000): 65.0 82.5 Test and Evaluation (\$1000): Unit Production (\$1000): 32.5 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule 6.9 Development Lead Time Constant (months): Development Lead Time Variable (months): 1.4 Qualification Lead Time Constant (months): 2.1 Qualification Lead Time Variable (months): 0.1 1.0 State-of-Art Factor (N.D.):

```
Subsystem:
                  EP (0205)
Configurations:
                  A11
Equipment Type: Battery cell
Performance
   Technical Characteristics
      (I)
                                                  10.0 amp-hr
           Capacity:
      (2)
           Watt/hour charge efficiency (N.D.):
                                                  0.65
     (3)
      (4)
     (5)
     (6)
     (7)
     (8)
     (9)
    (10)
  Power
                                                  NA
     Average Power (watts):
     'Maximum Power (watts):
                                                  NA.
     Minimum Power (watts):
                                                  NA
     Nominal Voltage (volts):
                                                  NA
     Maximum Voltage (volts):
                                                  NA
     Minimum Voltage (volts):
                                                  NA
     Converter/Inverter
        Requirement (flag):
  Weight (kg):
                                                  0.32 (0.70 lb)
                                                  127 (0.00449 ft<sup>3</sup>)
  Volume (cc):
   Vibration
     Random (g, rms):
     Non-Random (g):
   Temperature
                                                  300 (80.6° F)
     Maximum (<sup>o</sup>K):
                                                  277 (39.2° F)
     Minimum (°K):
  Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): . Sample Rate (sec 1): . .1 Word Length (bits): 8 Safety Failure Model (flag): 3 . Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10.49 hr): Dormancy Factor (N.D.): 6 Total Redundant Elements (No.): Cost 241.0 Design Engineering (\$1000): 88.0 Test and Evaluation (\$1000): 34.5 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 1.5 Qualification Lead Time Constant (months): 2.1 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

```
EP (0206)
Subsystem:
Configurations:
                   A11
Equipment Type: Battery cell
Performance
   Technical Characteristics
                                                 11.0 amp-hr
           Capacity:
      (1)
      (2) Watt/hour charge efficiency (N.D.):
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
   Power
      Average Power (watts):
                                                  NA
     Maximum Power (watts):
                                                  NA.
     Minimum Power (watts):
                                                  NA
     Nominal Voltage (volts):
                                                  N\overline{A}
     Maximum Voltage (volts):
                                                  NA
     Minimum Voltage (volts):
                                                  NA
     Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                                  0.38 (0.83 lb)
                                                  143 (0.00506 ft<sup>3</sup>)
   Volume (cc):
   Vibration
     Random (g, rms):
     Non-Random (g):
   Temperature
     Maximum (°K):
                                                  300 (80.6° F)
     Minimum (°K):
                                                  ·277 (39.2° F)·
  Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No. Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec 1): .1 Word Length (bits): 8 Safety Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): . 6 Total Redundant Elements (No.): Cost 255.0 Design Engineering (\$1000): 95.0 Test and Evaluation (\$1000): 37.0 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months):. 1.7 Qualification Lead Time Constant (months): 2. 1 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

```
Subsystem:
                   EP (0207)
Configurations:
                   A11
Equipment Type:
                   Battery cell
Performance
   Technical Characteristics
      (1)
            Capacity:
                                                      12.0 amp-hr
            Watt/hour charge efficiency (N.D.):
      (2)
                                                      0.65
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
     (9)
    (10)
   Power
     Average Power (watts):
                                                     NA
     Maximum Power (watts):
                                                     NA
     Minimum Power (watts):
                                                     NA
     Nominal Voltage (volts):
                                                     NA
     Maximum Voltage (volts):
                                                     NA
     Minimum Voltage (volts):
                                                     NA
     Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                                      0.454 (10.0 lb)
                                                      180 (0.00637 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
     Non-Random (g):
   Temperature
                                                      300 (80.6°F)
     Maximum (<sup>o</sup>K):
                                                      277 (39.2°F)
     Minimum (<sup>o</sup>K):
   Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry . Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 3 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety 3 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NAStandard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): 6 Cost Design Engineering (\$1000): 270.0 Test and Evaluation (\$1000): 102.0 39.5 Unit Production (\$1000): 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule 6.9 Development Lead Time Constant (months): 1.8 Development Lead Time Variable (months): 2. 1 Qualification Lead Time Constant (months): 0.1 Qualification Lead Time Variable (months): State-of-Art Factor (N.D.): 1.0

```
Subsystem:
                    EP (0208)
Configurations:
                    A11
Equipment Type:
                    Battery cell
Performance
   Technical Characteristics
      (I)
                                                       14.0 amp-hr
             Capacity:
      (2)
             Watt/hour charge efficiency (N.D.):
                                                       0.65
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
   Power
      Average Power (watts):
                                                      NA
      Maximum Power (watts):
                                                      NA
      Minimum Power (watts):
                                                      NA
      Nominal Voltage (volts):
                                                      NA
      Maximum Voltage (volts)
                                                      NA
      Minimum Voltage (volts):
                                                      NA
     Converter/Inverter
        Requirement (flag):
                                                       0,522 (1,15 lb)
   Weight (kg):
                                                     . 208 (0.00734 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
  Temperature
                                                       300 (80.6°F)
     Maximum (<sup>O</sup>K):
                                                       277 (39.2° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety 3 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): 6 Cost Design Engineering (\$1000): 295.0 Test and Evaluation (\$1000): 111.0 Unit Production (\$1000): 42.0 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 2.0. Qualification Lead Time Constant (months): 2.1 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

A11 Configurations: Battery cell Equipment Type: Performance Technical Characteristics 17.0 amp-hr (1)Capacity: Watt/hour charge efficiency (N.D.): 0.65(2)(3) . . (5) (6) (7)(8)(9) (10)Power NA . Average Power (watts): NA. Maximum Power (watts): NΑ Minimum Power (watts): NΑ Nominal Voltage (volts): NAMaximum Voltage (volts) NAMinimum Voltage (volts) Converter/Inverter Requirement (flag): 0.612 (1.35 lb) Weight (kg): 216 (0.00763 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 300 (80.6° F) Maximum (<sup>o</sup>K): 277 (39.2° F) Minimum (°K): Pressure (kg/m<sup>2</sup>):

EP (0209)

Subsystem:

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 3 Analog Points (No.): Digital Points (No.): . Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety ..; Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): ΝĄ Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 4. 6 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 330.0° Test and Evaluation (\$1000): 120.0 Unit Production (\$1000): 44.8 Reference Quantity (No.): 2 · Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 2.1 Qualification Lead Time Constant (months): 2.1 Qualification Lead Time Variable (months): **0.** 1 State-of-Art Factor (N.D.): 1.0

Subsystem: EP (0210) Configurations: A11 Equipment Type: Battery cell Performance Technical Characteristics (1) Capacity: 18.0 amp-hr (2) Watt/hour charge efficiency (N.D.): 0.65 (3) (4)(5) (6) (7). (8) (9) (10)Power Average Power (watts): NA, Maximum Power (watts): NA. Minimum Power (watts): NA Nominal Voltage (volts): NAMaximum Voltage (volts): ,NA Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): Weight (kg): 0.721 (1.59 lb) 442 (0.0156 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 300 (80.6° F) Maximum (<sup>o</sup>K): 277 (39.2° F) Minimum (<sup>o</sup>K):

Pressure (kg/m<sup>2</sup>):

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): -Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 . Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Safety Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): 6 Cost 340.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 129.0 Unit Production (\$1000): 47.6 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 2.3 2. 1 Qualification Lead Time Constant (months): Qualification Lead Time Variable (months): 0. 2 State-of-Art Factor (N.D.): 1.0

```
EP (0211)
Subsystem:
Configurations:
                    A11
Equipment Type:
                    Battery cell
Performance
   ·Technical Characteristics
                                                      26.0 amp-hr
             Capacity:
      (1)
           -Watt/hour charge efficiency (N.D.):
                                                    0.65
      (2)
      (3)
      (4)
     ·(5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                                      NA:
      Maximum Power (watts):
                                                      NA^{-}
                                                      NA
      Minimum Power (watts):
      Nominal Voltage (volts):
                                                      NA:
      Maximum Voltage (volts):
                                                      NA
     . Minimum Voltage (volts):
                                                      NA
      ·Converter/Inverter
    Requirement (flag):
                                                       0.91 (2.0 lb).
   Weight (kg):
                                                       306 (0.0108 ft<sup>3</sup>)
    Volume (cc):
    Vibration
      Random (g, rms):
      Non-Random (g):
    Temperature
                                                       300 (80,6°F)
      Maximum (<sup>o</sup>K):
                                                       277 (39.2° F)
      Minimum (<sup>o</sup>K):
   Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 3 Failure Parameters . Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): 6 Cost Design Engineering (\$1000): 421.0 Test and Evaluation (\$1000): 143.0 Unit Production (\$1000): 52, 2 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 2, 6 Qualification Lead Time Constant (months): 2. 1 Qualification Lead Time Variable (months): 0.2 State-of-Art Factor (N.D.):

F. 0

```
Subsystem:
                    EP (0212)
Configurations:
                    A11
Equipment Type:
                    Battery cell
Performance
   Technical Characteristics
            Capacity:
      \cdot(1)
                                                      26.0 amp-hr
           Watt/hour charge efficiency (N.D.):
      (2)
                                                      0.65
      (3) \cdot
      (4)
      (5)
      (6)
     .(7)
     (8)
      (9)
     (10)
   Power
     Average Power (watts):
                                                      NA
      Maximum Power (watts):
                                                      NA
      Minimum Power (watts):
                                                      NA
      Nominal Voltage (volts):
                                                      NA
      Maximum Voltage (volts):
                                                      NA.
      Minimum Voltage (volts):
                                                      NA
      Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                                     . 0. 91 (2. 0 lb)
                                                      340 (0.0120 ft<sup>3</sup>)
   Volume (cc):
                                                        11
   Vibration
      Random (g, rms):
      Non-Random (g):
   Tempe rature
      Maximum (<sup>o</sup>K):
                                                      300 (80.6° F)
      Minimum (<sup>o</sup>K):
                                                      277 (39.2° F)
   Pressure (kg/m<sup>2</sup>):
```

# Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 - 8 Word Length (bits): Safety Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>†9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost 421.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 143.0 Unit Production (\$1000): 52, 2 2 ' Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 2. 6, Qualification Lead Time Constant (months): , 2, 1 Qualification Lead Time Variable (months): 0.2. 1.0 State-of-Art Factor (N.D.):

```
EP (0213) ·
                   All
Configurations:
                   Battery cell
Equipment Type:
Performance
   Technical Characteristics
                                                · 28.0 amp-hr
      (1) Capacity:
      (2)
            Watt/hour charge efficiency (N.D.): 0.65
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
   Power
                                                    NA
      Average Power (watts):
                                                    NA '
      Maximum Power (watts):
      Minimum Power (watts):
                                                    'NA
      Nominal Voltage (volts):
                                                     NA
                                                     NA
      Maximum Voltage (volts):
      Minimum Voltage (volts):
                                                     NA
      Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                                     1.0 (2.3 lb)
                                                     413 (0.0146 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
                                                     300 (80.6° F)
      Maximum (<sup>o</sup>K):
                                                     277 (39.2°F)
      Minimum (°K):
   Pressure (kg/m<sup>2</sup>):
```

Subsystem:

### Performance (continued) CDPI Power Switching Commands (No.): . . Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry · Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec $^{-1}$ ): 1 Word Length (bits): 8 Safety Failure Model (flag): 3. Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA - Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 6 Total Redundant Elements (No.): Cost 440.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 151.0 55.0 Unit Production (\$1000): 2 . Reference Quantity (No.): Factor (N.D.): 1 Schedule . . . Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 2.8 Qualification Lead Time Constant (months): 2.1 Qualification Lead Time Variable (months): 0.2 State-of-Art Factor (N.D.): 1.0

```
ΕP
Subsystem:
                          (0214)
                   A11
Configurations:
Equipment Type: Battery cell
Performance
   Technical Characteristics
      (1)
           Capacity:
                                                      33.0 amp-hr
      (2)
            Watt/hour charge efficiency (N.D.):
                                                      0.65
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
  Power
      Average Power (watts):
                                                      NΑ
      Maximum Power (watts):
                                                      NA
      Minimum Power (watts):
                                                      NA
      Nominal Voltage (volts):
                                                      NA
      Maximum Voltage (volts):
                                                      NA
      Minimum Voltage (volts):
                                                      NA
      Converter/Inverter
        Requirement (flag):
                                                      1.1 (2.4 lb)
  Weight (kg):
                                                      326 (0.0115 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
  Temperature
     Maximum (<sup>o</sup>K):
                                                      300 (80.6^{\circ} F)
     Minimum (<sup>O</sup>K):
                                                      277 (39.2° F)
  Pressure (kg/m<sup>2</sup>):
```

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Point's (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost Design Engineering (\$1000): 485.0 Test and Evaluation (\$1000): 155.0 Unit Production (\$1000): 56.0 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 2.9 Qualification Lead Time Constant (months): 2. 1 Qualification Lead Time Variable, (months): 0.2 State-of-Art Factor (N.D.): 1.0

```
EP (0215)
Subsystem:
Configurations:
                    A11
Equipment Type:
                    Battery cell
Performance
   Technical Characteristics
      (1)
            Capacity:
                                                      40.0 amp-hr
     (2) Watt/hour charge efficiency (N.D.):
                                                     0.65
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                                      NΑ
      Maximum Power (watts):
                                                      NA
      Minimum Power (watts):
                                                      NΑ
      Nominal Voltage (volts):
                                                      ΝÁ
      Maximum Voltage (volts)
                                                      NA
     Minimum Voltage (volts)
                                                      NA
      Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                                      1.3 (2.8 lb)
                                                      487 (0.0172 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
                                                      300 (80.6° F)
      Maximum (<sup>o</sup>K):
                                                      277 (39.2° F)
      Minimum (<sup>o</sup>K):
   Pressure (kg/m<sup>2</sup>):
```

## Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No:): Sample Rate (sec 1): Word Length (bits): Low Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): Safety Failure Model (flag): 3 . Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA ' Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): Total Redundant Elements (No.): Cost 542.0 Design Engineering (\$1000): Test and Evaluation (\$1000): 167.0 Unit Production (\$1000): 60.0 2 Reference Quantity (No.): Factor (N.D.): Schedule Development Lead Time Constant (months): 6.9 3,0 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 2.1 Qualification Lead Time Variable (months): $\cdot$ 0.2 State-of-Art Factor (N.D.): 1.0

```
EP (0216)
Subsystem:
Configurations:
                   All .
Equipment Type:
                   Battery cell
Performance
   Technical Characteristics
            Capacity:
      (1)
                                                     50.0 amp-hr
            Watt/hour charge efficiency (N.D.):
                                                     0.65
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     10)
   Power
                                                     NA
      Average Power (watts):
                                                     NΑ
      Maximum Power (watts):
                                                     NA
      Minimum Power (watts):
                                                     NA
      Nominal Voltage (volts):
                                                     NΑ
      Maximum Voltage (volts)
                                                     NΑ
      Minimum Voltage (volts):
      Converter/Inverter
        Requirement (flag):
                                                      1.6 (3.61b)
   Weight (kg):
                                                     590 (0.0207 ft<sup>3</sup>)
   Volume (cc):
   Vibration '
      Random (g, rms):
      Non-Random (g):
   Temperature
                                                     300 (80.6° F)
      Maximum (<sup>o</sup>K):
                                                     277 (39.2° F)
      Minimum (<sup>o</sup>K):
```

Pressure (kg/m<sup>2</sup>):

```
Performance (continued)
    CDPI
       Power Switching Commands (No.):
       Time Tagged Commands (No.):
       Other Commands (No.):
       High Rate Telemetry
          Analog Points (No.):
          Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
          Word Length (bits):
      Low Rate Telemetry
         Analog Points (No.):
                                                     3
         Digital Points (No.):
         Sample Rate (sec<sup>-1</sup>):
                                                     1
         Word Length (bits):
                                                     8
Safety
   Failure Model (flag):
                                                     3
   Failure Parameters
      Failure Rate or Mean (x 10<sup>±9</sup> hr):
                                                   NA
      Standard Deviation (x 10<sup>+9</sup> hr):
      Dormancy Factor (N.D.):
   Total Redundant Elements (No.):
                                                     6
Cost
                                                   620.0
   Design Engineering ($1000):
   Test and Evaluation ($1000):
                                                   188.0
                                                    66.0
   Unit Production ($1000):
   Reference Quantity (No.):
   Factor (N.D.):
Schedule
   Development Lead Time Constant (months):
                                                     6.9
   Development Lead Time Variable (months):.
                                                     3, 5
   Qualification Lead Time Constant (months):
                                                     2. 1
   Qualification Lead Time Variable (months):
                                                     0.3
 State-of-Art Factor (N.D.)
                                                     1.0
```

```
Subsystem:
                    EP (0217)
Configurations:
                   A11
Equipment Type:
                    Battery cell
Performance
   Technical Characteristics
      (1)
            Capacity:
                                                     60.0 amp-hr
      (2) Watt/hour charge efficiency (N.D.):
      (3)
      (4)
      (5)
      (6)
     (7)
      (8)
      (9)
    (10)
  Power
    · Average Power (watts):
                                                   · NA
     Maximum Power (watts):
                                                    NA
     Minimum Power (watts):
                                                    NA.
     Nominal Voltage (volts):
                                                    NA
     Maximum Voltage (volts):
                                                    NA
     Minimum Voltage (volts):
                                                    NA
     Converter/Inverter
       Requirement (flag):
  Weight (kg):
                                                     I.8 (4.0 lb)
  Volume (cc):
                                                    650 (0.0230 ft<sup>3</sup>)
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
     Maximum (°K):
                                                    300 (80.6°F)
     Minimum (<sup>o</sup>K);
                                                    277 (39.2° F)
  Pressure (kg/m<sup>2</sup>):
```

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): NA Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 6 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 685.0 Test and Evaluation (\$1000): 196.0. Unit Production (\$1000): 69.0 Reference Quantity (No.): 2 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 6.9 Development Lead Time Variable (months): 3.7 Qualification Lead Time Constant (months): 2. 1 Qualification Lead Time Variable (months): 0.3 State-of-Art Factor (N.D.): 1.0

```
ÉP (0218)
Subsystem:
Configurations:
                       A11
Equipment Type:
                       Battery cell
Performance '
   Technical Characteristics
                                                      65.0 amp-hr
            Capacity:
      (I)
             Watt/hour charge efficiency (N.D.):
                                                      0.65
      (2)
      (3)
      (4)
      (5)
      (6)
    (7)
      (8)
      (9)
     (10)
   Power
                                                      NA
      Average Power (watts):
                                                      NA
      Maximum Power (watts):
                                                      NA
      Minimum Power (watts):
                                                      -NA
      Nominal Voltage (volts):
                                                      NA
      Maximum Voltage (volts):
                                                      NA
      Minimum Voltage (volts):
      Converter/Inverter
        Requirement (flag):
                                                      2.0 (4.5 lb).
   Weight (kg):
                                                      670 (0.0236 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Tempe rature
                                                      300 (80.6° F)
      Maximum (<sup>o</sup>K):
                                                      277 (39.2° F)
      Minimum (<sup>o</sup>K):
   Préssure (kg/m<sup>2</sup>):
```

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No:): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 3 Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety Failure Model (flag): 3 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) NΑ Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 6 Total Redundant Elements (No.): · Cost 719.0 Design Engineering (\$1000): 209.0 Test and Evaluation (\$1000): . Unit Production (\$1000): 72.0. 2 Reference Quantity (No.): 1 Factor (N.D.): Schedule 6.9 Development Lead Time Constant (months): 4.0 Development Lead Time Variable (months): Qualification Lead Time Constant (months): 2.1 Qualification Lead Time Variable (months): 0.4 1,0 State-of-Art Factor (N.D.):

```
ER (0301)
Subsystem:
Configurations:
                        All
                        Battery Charger
Equipment Type:
Performance
   Technical Characteristics
             Current rating:
                                      10,0 amps
      (1)
             Efficiency (N.D.):
                                      1.0
      (2)
      (3)
      (4)
      (5)
      (6)
      (7)
     (8)
      (9)
     (-10)
   Power
      Average Power (watts):
                                      NA
      Maximum Power (watts):
                                      ΝΆ
      Minimum Power (watts):
                                      NA
     Nominal Voltage (volts):
                                      ŊA
     Maximum Voltage (volts):
                                      NA
      Minimum Voltage (volts):
                                      NA
      Converter/Inverter
        Requirement (flag):
                                      1.70 (3.75 lb)
  Weight (kg):
                                      3.1 \times 10^3 (0.11 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
                                      311 (100° F)
      Maximum (<sup>o</sup>K):
                                      266 ( 20° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 3 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry 3 Analog Points (No.): 1 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): . 8 Safety 1 Failure Model (flag): Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 260 Standard Deviation (x 10<sup>+9</sup> hr); Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): 0 Test and Evaluation (\$1000): 0 Unit Production (\$1000): 0 . 1 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 8.1

### 2-346

3.5

2:3

0.3

1.0

Development Lead Time Variable (months):

Qualification Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

```
Configurations:
                        All
Equipment Type:
                        Battery Charger
Performance
   Technical Characteristics
                                     6.5 amps
            Current rating:
      (1)
      (2)
            Efficiency (N.D.):
                                     .1.0
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
                                      NA
      Average Power (watts):
      Maximum Power (watts):
                                      NΑ
     Minimum Power (watts):
                                      NA
     Nominal Voltage (volts):
                                      NΑ
     Maximum Voltage (volts):
                                      NA
                                      NA
     Minimum Voltage (volts):
      Converter/Inverter
        Requirement (flag):
                                      1.66 (3.67 lb)
  Weight (kg):
                                     2.2 \times 10^3 (0.076 ft<sup>3</sup>)
   Volume (cc):
   Vibration
     Random (g, rms):
     Non-Random (g):
   Temperature
                                     311 (100° F)
     Maximum (<sup>o</sup>K):
   Minimum (<sup>o</sup>K):
                                     266 (20° F)
  Pressure (kg/m<sup>2</sup>):
```

EP (0302)

Subsystem:

### Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): 3. Other Commands (No.): High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 1 Digital Points (No.): Sample Rate (sec<sup>-1</sup>): 1 8 Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 260 Standard Deviation (x 10<sup>+9</sup> hr): 0,5 Dormancy Factor (N.D.): 4 Total Redundant Elements (No.): Cost 0 Design Engineering (\$1000): Test and Evaluation (\$1000): 0 Unit Production (\$1000): 1 Reference Quantity (No.): 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 8.1 Development Lead Time Variable (months): 3.5

Qualification Lead Time Constant (months):

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

· 2.3

. 1.0

EP (0401) Subsystem: Configurations: Shunt and Discharge Regulation Discharge Regulator . Equipment Type: Performance Technical Characteristics Power capability: 59.0 watts (1)0.85 (2)Efficiency (N. D.): (3)(4)(5) (6) (7)(8) (9) (10)Power NA Average Power (watts): NA Maximum Power (watts): Minimum Power (watts): NA Nominal Voltage (volts): NA Maximum Voltage (volts): NA Minimum Voltage (volts): NA Converter/Inverter Requirement (flag): 1.4 (3.0 lb) Weight (kg):  $8.5 \times 10^3$  (0.3 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100° F) Maximum (<sup>o</sup>K):

Minimum (<sup>o</sup>K):

266 (20° F)

### Performance (continued) **CDPI** Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 3 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 250 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 70.0 Test and Evaluation (\$1000): 70.0 Unit Production (\$1000): 25.0 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 8.1 Development Lead Time Variable (months): 2.0 Qualification Lead Time Constant (months): 2,3 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.):

1,0

Subsystem: EP (0501) Shunt & Shunt and Discharge Regulation Configurations: Shunt Regulator Equipment Type: Performance Technical Characteristics 62.0 watts Maximum power capacity: (1)(2) (3)(4)(5) (6) (7)(8)(9) (10)Power Average Power (watts): ΝA Maximum Power (watts): NA Minimum Power (watts): NA Nominal Voltage (volts): NΑ Maximum Voltage (volts): NAMinimum Voltage (volts): Converter/Inverter Requirement (flag): 2.0 (4.3 lb) Weight (kg):  $1.2 \times 10^4$  (0.43 ft<sup>3</sup>) Volume (cc): Vibration Random (g, rms) Non-Random (g): Temperature 373 (212° F) Maximum (<sup>o</sup>K): 218 (-67° F) Minimum (<sup>o</sup>K): Pressure (kg/m<sup>2</sup>):

# Performance (continued)

### CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 2 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 200 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): 80.0 Test and Evaluation (\$1000): 40.0 Unit Production (\$1000): 7.0 Reference Quantity (No.): Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 9.5 Development Lead Time Variable (months): 3,6 Qualification Lead Time Constant (months): 2.3 Qualification Lead Time Variable (months): 0.2 State-of-Art Factor (N.D.): 1.0

```
Subsystem:
                       EP (0601)
Configurations:
                       All
Equipment Type:
                       Battery Charger
Performance .
   Technical Characteristics
      (1)
             Current rating:
                                      10.0 amps
      (2)
             Efficiency (N.D.):
                                     0.85
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
    (10)
  Power
     Average Power (watts):
                                     NA
     Maximum Power (watts):
                                     NA
     Minimum Power (watts):
                                     NΑ
     Nominal Voltage (volts):
                                     NA
     Maximum Voltage (volts):
                                     NA
     Minimum Voltage (volts):
                                     NA
     Converter/Inverter
        Requirement (flag):
                                     3.2 (7.0 lb)
  Weight (kg):
                                     4.2 \times 10^4 \ (1.5 \text{ ft}^3)
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
                                     311 (100° F)
     Maximum (<sup>O</sup>K):
     Minimum (<sup>O</sup>K);
                                     266 ( 20° F)
  Pressure (kg/m<sup>2</sup>):
```

# Performance (continued)

# CDPI

Power Switching Commands (No.):	
Time Tagged Commands (No.):	
Other Commands (No.):	6' .
High Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
Low Rate Telemetry	
Analog Points (No.):	3
Digital Points (No.):	1
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	
Failure Model (flag):	1
Failure Parameters	
Failure Rate or Mean (x 10 <sup>±9</sup> hr)	550
Standard Deviation (x 10 <sup>+9</sup> hr):	ş -
Dormancy Factor (N.D.):	0.!
Total Redundant Elements (No.):	, <b>4</b>
Cost	
Design Engineering (\$1000):	0
Test and Evaluation (\$1000):	
Unit Production (\$1000):	0.
Reference Quantity (No.):	1-
Factor (N.D.):	1
Schedule	•
Development Lead Time Constant (months):	8.1
Development Lead Time Variable (months):	3,E
Qualification Lead Time Constant (months):	2,3
Qualification Lead Time Variable (months):	0.3
State-of-Art Factor (N.D.):	1.0

```
Shunt and Discharge Regulation
Configurations:
Equipment Type:
                       Central Control Unit .
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
      (5)
      (6)
    . (7)
      (8)
      (9)
    (10)
  rower,
     Average Power (watts):
                                     NA
     Maximum Power (watts):
                                     NA
     Minimum Power (watts):
                                     ΝA
     Nominal Voltage (volts):
                                     NA
     Maximum Voltage (volts):
                                     NΑ
     Minimum Voltage (volts):
                                     NA
      Converter/Inverter
        Requirement (flag):
                                     0.45 (1.0 lb)
  Weight (kg):
                                     2.8 \times 10^3 \ (0.1 \text{ ft}^3)
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
                                     311 (100° F)
     Maximum (<sup>o</sup>K):
                                     266 ( 20° F)
     Minimum (<sup>o</sup>K):
  Pressure (kg/m<sup>2</sup>):
```

EP (0701)

Subsystem:

# Performance (continued)

CDPI	
Power Switching Commands (No.):	
Time Tagged Commands (No.):	
Other Commands (No.):	-,10,
High Rate Telemetry	
Analog Points (No.):	
Digital Points (No.):	
Sample Rate (sec <sup>-1</sup> ):	
Word Length (bits):	
Low Rate Telemetry	
Analog Points (No.):	2
Digital Points (No.):	2 .
Sample Rate (sec <sup>-1</sup> ):	1
Word Length (bits):	8
Safety	•
Failure Model (flag):	1
Failure Parameters	•
Failure Rate or Mean (x 10 <sup>±9</sup> hr)	950
Standard Deviation (x 10 <sup>+9</sup> hr):	_
Dormancy Factor (N.D.):	0.5
Total Redundant Elements (No.):	4
Cost	-
Design Engineering (\$1000):	32.5
Test and Evaluation (\$1000):	32,5
Unit Próduction (\$1000):	11,5
Reference Quantity (No.):	1
Factor (N.D.):	1
Schedule	, , ;
Davidanment Land Time Completed (1)	0.3
Development Lead Time Constant (months):	8.1
Development Lead Time Constant (months):  Development Lead Time Variable (months):	1.2
Development Lead Time Variable (months):	1.2

```
Subsystem:
                       EP (0801)
Configurations:
                       Series Load Regulation
Equipment Type:
                       Series Load Regulator
Performance
   Technical Characteristics
      (1)
            Output power:
                                    350.0 watts
            Efficiency (N. D.):
      (2)
                                    0.9
      (3)
      (4)
      (5)
      (6)
     (7)
      (8)
      (9)
    (10)
  Power
                                    NΑ
     Average Power (watts):
     Maximum Power (watts):
                                    NA
     Minimum Power (watts):
                                    NA
     Nominal Voltage (volts):
                                    NΑ
     Maximum Voltage (volts):
                                    NΑ
     Minimum Voltage (volts):
                                    NA
     Converter/Inverter
        Requirement (flag):
                                    0.73 (1.6 lb)
  Weight (kg):
                                    7.4 \times 10^3 (0.26 ft<sup>3</sup>)
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperàture
     Maximum (°K):
                                    311 (100° F)
     Minimum (<sup>o</sup>K):
                                    266 ( 20° F)
  Pressure (kg/m<sup>2</sup>):
```

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 6 . High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec-1): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec 1): 1 Word Length (bits): 8 Safety Failure Model (flag): 1. Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 650 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0,5 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): 45.0 Test and Evaluation (\$1000): 45.0 Unit Production (\$1000): 16.0 Reference Quantity (No.): 1 1 Factor (N.D.): Schedule Development Lead Time Constant (months): 8.1 Development Lead Time Variable (months): 1.5 Qualification Lead Time Constant (months): 2.3

0.1

1.0

Qualification Lead Time Variable (months):

State-of-Art Factor (N.D.):

```
Subsystem:
                   EP (0802)
Configurations:
                   Series Load Regulation !
Equipment Type:
                   Series Load Regulator
Performance
   Technical Characteristics
      (1)
            Output power:
                                    225.0 watt
      (2)
            Efficiency (N.D.):
                                    0.9
      (3)
      (4)
      (5)
      (6)
      (7)
     (8)
     (9)
    (10)
  Power
     Average Power (watts):
                                    NA
     Maximum Power (watts):
                                    NA
     Minimum Power (watts):
                                    NA
     Nominal Voltage (volts):
                                    NA
     Maximum Voltage (volts):
                                    NA
     Minimum Voltage (volts):
                                   NA
     Converter/Inverter
       Requirement (flag):
  Weight (kg):
                                   3.6 (8.0 lb)
                                   8.5 \times 10^3 (0.30 ft<sup>3</sup>
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
     Maximum (<sup>o</sup>K):
                                   311 (100°F)
     Minimum (<sup>o</sup>K):
                                   266 ( 20° F)
```

Pressure (kg/m<sup>2</sup>):

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): High Rate Telemetry. Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1' Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) 650 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): 145.0 Test and Evaluation (\$1000): 145.0 Unit Production (\$1000): <sup>~</sup> 51.5 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 8. 1 Development Lead Time Variable (months): 3.3 Qualification Lead Time Constant (months): 2.3 Qualification Lead Time Variable (months): State-of-Art Factor (N.D.):

```
EP (0901)
Subsystem:
Configurations: All
Equipment Type:
                    Battery Charger
Performance
   Technical Characteristics
      (1) Current rating:
                                     22.0 amps
      (2)
             Efficiency (N.D.):
                                     0.85
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
      (9)
     (10)
   Power
      Average Power (watts):
                                     NA
      Maximum Power (watts):
                                     NA
      Minimum Power (watts):
                                     NA
      Nominal Voltage (volts):
                                     NA
      Maximum Voltage (volts):
                                     NA
      Minimum Voltage (volts):
                                     NA
      Converter/Inverter
        Requirement (flag)
   Weight (kg):
                                     3.6 (8.0 lb)
                                     8.5 \times 10^3 (0.30 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
      Maximum (<sup>0</sup>K):
                                     311 (100°F)
      Minimum (<sup>o</sup>K):
                                     266 ( 20° F)
   Pressure (kg/m<sup>2</sup>):
```

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 6 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): Sample Rate (sec-1): 1 4 8 Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr) 650 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 0 Test and Evaluation (\$1000): 0 Unit Production (\$1000): 0 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 8.1 Development Lead Time Variable (months): 3.5 Qualification Lead Time Constant (months): 2.3 Qualification Lead Time Variable (months): .0.3

1 0

State-of-Art Factor (N.D.):

```
Subsystem:
                   EP (0902)
Configurations:
                   All
Equipment Type:
                   Battery Charger
Performance
   Technical Characteristics
      (1)
            Current rating:
                                     12.0 amps
      (2)
            Efficiency (N.D.):
                                    0.85
      (3)
      (4)
      (5)
      (6)
      (7)
      (8)
     (9)
     (10)
   Power
      Average Power (watts):
                                    NA
     Maximum Power (watts):
                                    NA
     Minimum Power (watts):
                                    AM
     Nominal Voltage (volts):
                                    NA
     Maximum Voltage (volts):
                                    NΑ
     Minimum Voltage (volts):
                                    NA
      Converter/Inverter
        Requirement (flag):
   Weight (kg):
                                    0.64 (1.41b)
                                    8.55 \times 10^3 (0.302 ft<sup>3</sup>)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
     Maximum (<sup>o</sup>K):
                                     311 (100° F)
      Minimum (°K):
                                     266 ( 20° F).
   Pressure (kg/m<sup>2</sup>):
```

#### Performance (continued)

### CDPI Power Switching Commands (No.) Time Tagged Commands (No.): Other Commands (No.): 6 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec $^{-1}$ ): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): . 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 650 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): 4 Cost Design Engineering (\$1000): ٠0 Test and Evaluation (\$1000): 0 Unit Production (\$1000): 0 Reference Quantity (No.): 1 Factor (N.D.): 1 chedule . 8. 1. Development Lead Time Constant (months): Development Lead Time Variable (months): 3, 5 Qualification Lead Time Constant (months): 2.3 Qualification Lead Time Variable (months): 0.3

State-of-Art Factor (N.D.):

1.0

Subsystem: EP (1001)Configurations: Series Load Regulation Equipment Type: Solar Power Distributor Performance Technical Characteristics . (1)(2)(3)(4)(5) (6)(7)(8) (9) (10)Power Average Power (watts): NA Maximum Power (watts):. NA Minimum Power (watts); NANominal Voltage (volts): NA Maximum Voltage (volts): NAMinimum Voltage (volts): NA Converter/Inverter Requirement (flag): Weight (kg): 0.45 (1.0 lb)  $2.8 \times 10^3$  (0.1 ft<sup>2</sup> Volume (cc): Vibration Random (g, rms): Non-Random (g): Temperature 311 (100°F) -Maximum (<sup>o</sup>K): 266 ( 20° F) Minimum (°K): Pressure (kg/m<sup>2</sup>):

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 3 High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.) 4 Cost Design Engineering (\$1000): 32.5 Test and Evaluation (\$1000): 32, 5 Unit Production (\$1000): 11.5 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 8.1 Development Lead Time Variable (months): 1. 2 Qualification Lead Time Constant (months): 2.3 Qualification Lead Time Variable (months): 0.1 State-of-Art Factor (N.D.): 1.0

```
Subsystem:
                    EP (1101)
Configurations:
                    Series Load Regulation
Equipment Type:
                    Power Distributor ...
Performance
   Technical Characteristics
      (1)
      (2)
      (3)
      (4)
      (5)
      (6)
     (7)
     (8)
     (9)
    (10)
  Power
     Average Power (watts):
                                     NA
     Maximum Power (watts):
                                     NA
     Minimum Power (watts):
                                     NA
     Nominal Voltage (volts):
                                     NA
     Maximum Voltage (volts):
                                     NA
     Minimum Voltage (volts):
                                     NA
     Converter/Inverter
       Requirement (flag):
  Weight (kg):
                                     0.45 (1.01b)
                                     2.8 \times 10^3 (0.1 ft<sup>3</sup>)
  Volume (cc):
  Vibration
     Random (g, rms):
     Non-Random (g):
  Temperature
     Maximum (<sup>o</sup>K):
                                    311 (100°F)
    Minimum (<sup>o</sup>K):
                                    ·266 ( 20° F)
 Pressure (kg/m<sup>2</sup>):
```

### Performance (continued) CDPI Power Switching Commands (No.): Time Tagged Commands (No.): Other Commands (No.): 3. High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): 3 Digital Points (No.): 1 Sample Rate (sec<sup>-1</sup>): 1 Word Length (bits): 8 Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 300 . Standard Deviation (x 10<sup>+9</sup> hr) Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 32.5 Test and Evaluation (\$1000): 32.5. Unit Production (\$1000): 11.5 Reference Quantity (No.): 1 Factor (N.D.): 1 Schedule Development Lead Time Constant (months): 8.1 Development Lead Time Variable (months): 1.2 Qualification Lead Time Constant (months): ´2. 3 Qualification Lead Time Variable (months): 0. I' State-of-Art Factor (N.D.): 1.0

```
Configurations:
                     Shunt Regulation
Equipment Type:
                    Power Control Unit
 Performance
    Technical Characteristics
       (1)
       (2)
       (3)
       (4)
       (5)
       (6)
       (7)
       (8)
       (9)
     (10)
   Power
      Average Power (watts):
                                      NA
      Maximum Power (watts):
                                      NA
      Minimum Power (watts):
                                      NA
      Nominal Voltage (volts):
                                      NA
      Maximum Voltage (volts):
                                      NA
      Minimum Voltage (volts):
                                      NA
      Converter/Inverter
Requirement (flam).
   Weight (kg):
                                     4.76 (10.5 lb)
                                     6.2 \times 10^3 \quad (0.22 \text{ ft}^3)
   Volume (cc):
   Vibration
      Random (g, rms):
      Non-Random (g):
   Temperature
     Maximum (°K):
                                     311 (100° F)
     Minimum (<sup>0</sup>K):
                                     266 ( 20° F)
  Pressure (kg/m<sup>2</sup>):
```

EP (1201)

Subsystem:

### Performance (continued) CDPI Power Switching Commands (No. 1. Time Tagged Commands (No.): Other Commands (No.): 4 ' High Rate Telemetry Analog Points (No.): Digital Points (No.): Sample Rate (sec<sup>-1</sup>): Word Length (bits): Low Rate Telemetry Analog Points (No.): Ž Digital Points (No.): 2 . Sample Rate (sec<sup>-1</sup>): Word Length (bits): Safety Failure Model (flag): 1 Failure Parameters Failure Rate or Mean (x 10<sup>±9</sup> hr): 421 Standard Deviation (x 10<sup>+9</sup> hr): Dormancy Factor (N.D.): 0.5 Total Redundant Elements (No.): Cost Design Engineering (\$1000): 175.0 Test and Evaluation (\$1000): 175.0 Unit Production (\$1000): 57.0 . Reference Quantity (No.): 1 Factor (N.D.): . 1 Schedule Development Lead Time Constant (months): 8.1 . Development Lead Time Variable (months): 3.8 Qualification Lead Time Constant (months): 2.3 Qualification Lead Time Variable (months): - 0.3 State-of-Art Factor (N.D.):

1.0

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